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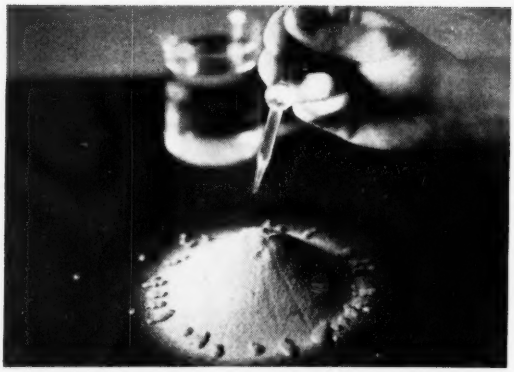

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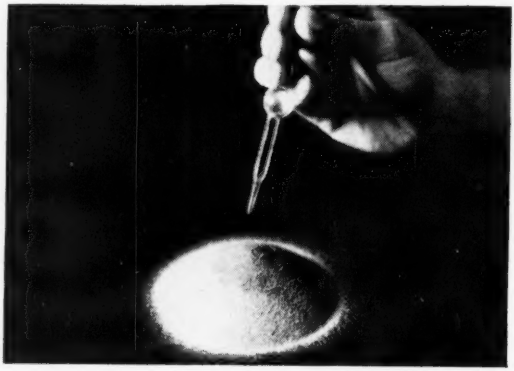

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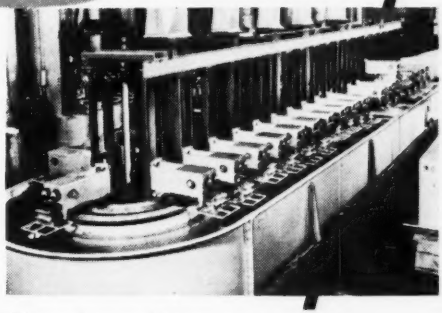

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Products finishing

MARCH 1952
VOLUME 16 • NUMBER 6

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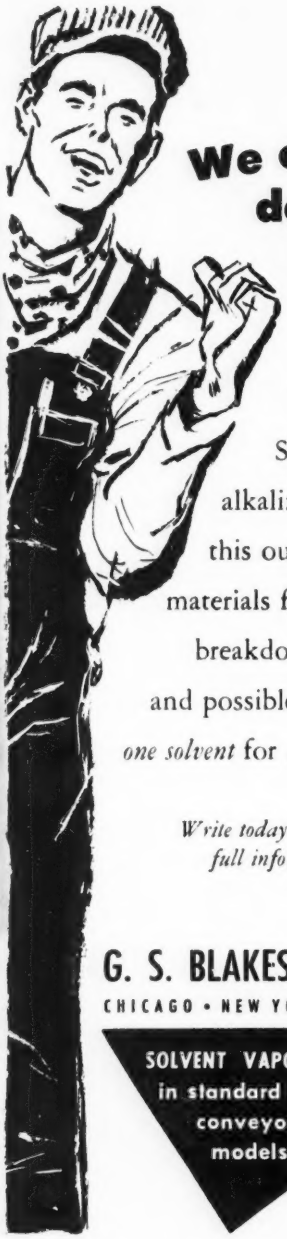

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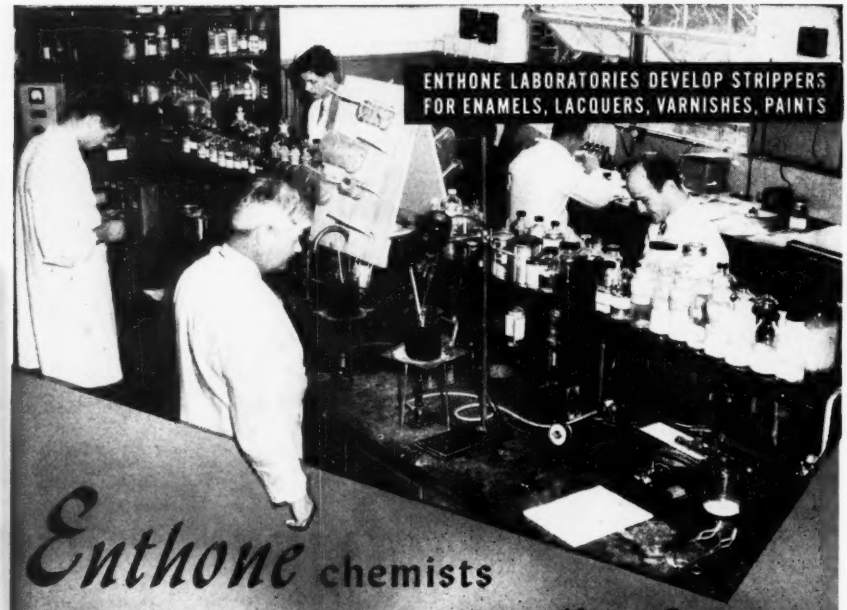

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editorial

MARCH, 1952

Vol. 16, No. 6

SCRAP---Reduce It; Put It Back To Work!

In metal manufacturing processes, by their very nature, a definite percentage of the raw material is converted into scrap rather than the finished product. Industry must approach this vital problem along two paths: (1) reduce the amount of scrap generated; (2) get the scrap metal that is produced back to the basic metal producer.

The amount of scrap formed can be reduced or controlled by designing each product so as to reduce waste to a minimum, and by utilizing strict quality control procedures in the manufacturing process so that only acceptable parts are produced.

With the military production program shifting into high gear and with so many metals on the critical materials list, it is imperative that a positive scrap collection program be instituted and energetically pursued throughout industry. Anything less will not only have an adverse effect on the civilian economy, but may seriously hamper the total production effort.

In addition to scrap metal produced during normal operation, sources of good scrap such as old, out-of-service machinery and equipment should be tapped. A careful survey will reveal many pieces of old equipment (old plating racks, tanks, and miscellaneous machinery, for example) that can be returned, through re-processing, to active service.

Realizing the fact that critical metals must be used sparingly, and that scrap must be returned to useful service, military organizations, even in overseas operations, have initiated a metals conservation program which includes scrap collection.

Certainly civilian industry can do no less.

Electroplating.

By EZRA A. BLOUNT
Editor

PRODUCTS of the casket manufacturing industry, by reason of the wide range of needs and wants to be supplied, must conform with a high quality standard, yet permit a considerable variation in exterior appearance over a wide range of models. To accomplish this result, electroplating and many lacquer finishes are specified by casket designers, the artful combination of the two finishing methods producing many artistic effects. While the many colors and artistic effects cannot be seen in the photo serving as the article heading, it does reveal the finish luster on these products.

A leader in the casket manufacturing field and one that confines its entire attention to metal caskets is the Belmont Casket Manufacturing Company, originator of the lead coated metal casket. Founded in 1906 at Bellaire, Ohio, the company moved part of the factory to Columbus, Ohio, in 1916. The modern, four-story Columbus plant now serves as the main office and the finishing and assembly plant.

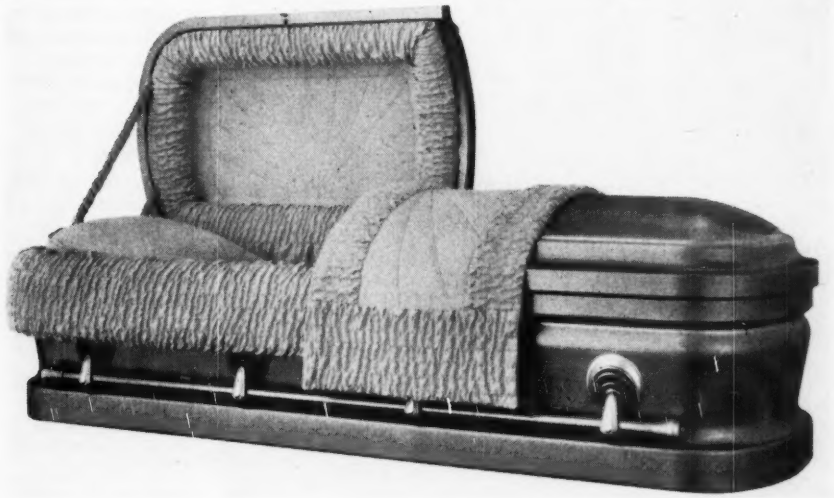
The company takes great pride in the policies it has instituted for the benefit of its employees. Group insurance, a two-week plant shutdown with paid vacations, retirement benefits, Christmas bonus, company softball, bowling, and golf teams are but a few of the activities and benefits that encourage Belmont employees to remain with the company. Mr. J. N. Diday, vice president, who joined the company in 1907, reports proudly that there are 52 employees, each with over 25 years' service to his credit. Since quality casket finishes cannot be obtained except from skilled finishers, and since such skill

Metallic and Clear Lacquers Utilized in Casket Finishing

must be developed over a period of years, the company profits greatly from its ability to retain skilled operators in its employ.

The manufacturing process plan at Belmont specifies that parts be formed at the Bellaire, Ohio plant and shipped to Columbus where they are completely assembled. By reason of the size of the casket parts, large presses are required in the forming operation which is rightly established as a separate function.

Shells are formed from 16 and 18-gauge steel and 15 and 17-gauge solid copper. Terne plate was formerly employed, but when that metal became dif-



ficult to obtain, uncoated steel was substituted and a lead plating process installed to lead plate the caskets. Hardware parts are made of steel, zinc-base die castings, antimony-lead castings, bronze castings, and finished to produce a wide variety of effects.

Plating Steel Hardware

Formed steel hardware parts are finished in various shades of copper plate, or oxidized silver plate and coated with clear lacquer. Polishing precedes plating, and is accomplished generally in three operations.

1. Polish on a 180 emery set-up wheel, using an 8-inch wheel turning at 2,300 r.p.m.
2. Polish on a 180 emery set-up wheel, using a tallow lubricant.
3. Polish on sewed buff, using Stevens greaseless buffing composition for this operation.

Figure 1 is a view of one section of the polishing department.

Following the polishing operation, steel parts are either copper plated or silver plated. The copper plating process is as follows:

1. Rack and electroclean in a reverse current cleaner containing 12 oz./gal. Anodex. Temperature, 190 to 212 deg. F. Current density, 50 amp./sq. ft.
2. Cold running water rinse.
3. Dip in 10 per cent hydrochloric acid.
4. Cold water rinse.
5. Nickel plate 30 minutes at 5 to 15 amp./sq. ft. in a solution composed of:

Nickel (as metal)	3 oz./gal.
Ammonium chloride	2 oz./gal.
Boric acid	4 oz./gal.
pH	5.8 to 5.9

   No agitation. Hydrogen peroxide used to control pitting.
6. Cold water rinse.
7. Acid copper plate for 30 minutes at 10 to 15 amp./sq. ft. in a solution containing:
   Copper sulfate 27oz./gal.
   Free sulfuric acid 6.5 oz./gal.
8. Cold water rinse.
9. Hot water rinse.

Fig. 1—In this corner of the Belmont polishing room steel hardware parts are being prepared for plating.

Buffing and clear lacquering, or other similar treatment, as specified, complete the process.

Steel parts to be silver plated are polished and nickel plated in exactly the same manner as described in the preceding paragraph. However, after being nickel plated, they are rinsed and, without being reracked, are processed as follows:

1. Silver strike 10 to 15 seconds in a solution containing:
   Free sodium cyanide 8.0 oz./gal.
   Silver metal 0.4 oz./gal.
2. Silver plate 1 hour to 1¼ hours at 5 amp./sq. ft. in a solution containing:
   Silver metal 1.5 oz./gal.
   Free sodium cyanide 5.0 oz./gal.
   Carbon disulfide brightener, 2 oz./qt. of silver strike solution, added as required. (Figure 2 shows a plater removing silver plated hardware from the tank.)
3. Rinse in silver recovery —concentration rinse.
4. Rinse in cold water.
5. Oxidize in a solution containing ⅛ oz./gal. Du Pont sodium polysulfide, operated at 180 to 190 deg. F.
6. Rinse in cold water.
7. Rinse in hot water and dry.

Of course, if plain silver is the finish desired, then the process is terminated at Step 4, above. By the same token, the oxidizing process, Steps 5 to 7, above, can be applied following the copper plating cycle.

Bronze parts are silver plated by the same process as that described for steel parts.

Plating Zinc Base Die Castings

The die casting surfaces are prepared for plating by polishing on a sheepskin wheel, using a lime buffing or coloring compound. Die castings are then copper plated as follows:

1. Electroclean (reverse current) for 5 to 10 seconds in a solution of 4 oz./gal. Dyclene E, operated at 190 to 212 deg. F.

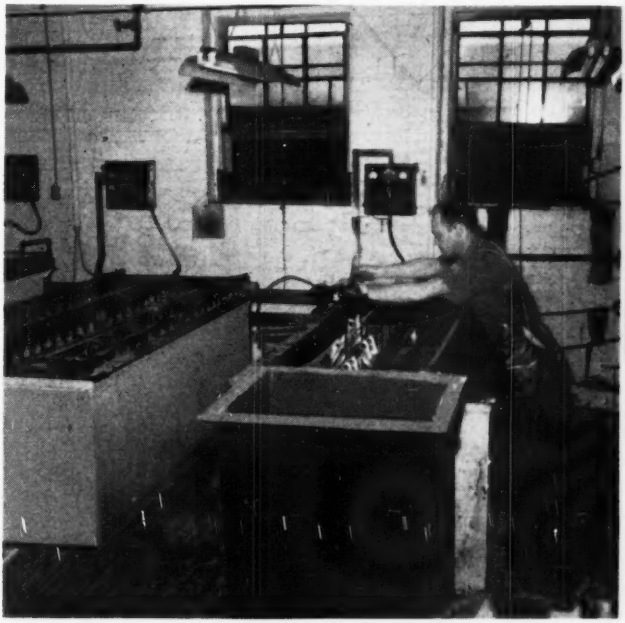


Fig. 2—Operator removes a rack of silver plated casket hardware from the plating tank. The plating tanks are almost all steel, rubber - lined (except cleaners, rinses, and cyanide copper), and are coated on the outside with Tygon protective paint. Power is supplied to this plating room from a 5,000-ampere Hanson-Van Winkle-Munning motor-generator set.

2. Cold water rinse.
3. Dip in 3 per cent sulfuric acid.
4. Cold water rinse.
5. Cyanide copper strike for 2 to 3 seconds at 4 to 5 volts. Solution:
   Copper 2-3 oz./gal.
   Free sodium cyanide 1.2 oz./gal.
   Sodium carbonate 2.0 oz./gal.
   Rocheltex 7 per cent by volume
   Temperature 140 deg. F.
6. Cyanide copper plate (same solution as Step 5) for 20 to 30 minutes at 5 amp./sq. ft.
7. Cold water rinse.
8. Hot water rinse.

Die cast parts to be silver plated are processed as above down through Step 7, and then treated as follows:

1. Silver strike 10 to 15 seconds.
2. Silver plate 1 hour.
3. Rinse in concentration rinse.
4. Cold water rinse.
5. Hot water rinse.

The processes for oxidizing after either copper or silver plating are the same as previously described.

Plating Antimony-Lead Alloys

Antimony-lead alloy castings are smoothed on a sewed buff using tripoli buffing compound, naphtha washed, and then bright buffed using a lime nickel buffing composition. The castings are copper plated in the following process sequence:

1. Rack and electroclean (reverse current) in Anodex cleaner.
2. Cold water rinse.
3. Dip in 10 per cent hydrochloric acid.
4. Cold water rinse.
5. Cyanide copper strike.
6. Cold water rinse.
7. Nickel plate 30 minutes.
8. Cold water rinse.
9. Acid copper plate 30 minutes.
10. Cold water rinse.
11. Hot water rinse and dry.

Antimony-lead castings to be silver plated are processed as above through Step 8, and then are treated as follows:

1. Silver strike 10 to 15 seconds.
2. Silver plate 1 hour.
3. Rinse in silver recovery tank.
4. Cold water rinse.
5. Hot water rinse and dry.

Oxidized finishes on copper or silver may be produced as previously described.

Fig. 3—Highlighting copper plated and oxidized steel casket hardware parts. A mask protects areas not to be highlighted on some parts; on others the shape of the product is such that no mask is required.

Creating Various Finish Effects with Colored Clear or Translucent Lacquers

The copper or silver plated parts, either

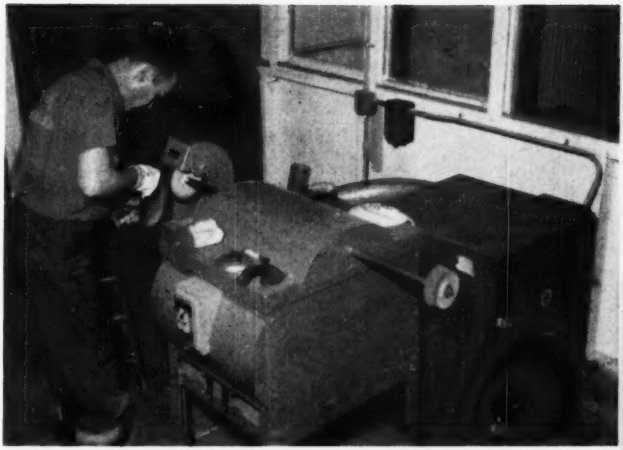


Fig. 4 — Plated and oxidized parts are buffed on a loose buffing wheel to remove the black surface from certain areas. A Torit dust collector (right background) removes buffing dirt from the air and returns the filtered air to the room.

plated, or plated and oxidized, may be treated in a combination of various brushing, buffing and lacquering (air dry lacquers) processes to create a wide variety of decorative finish effects. One such finish is produced by wire brushing (0.0025-inch diameter wire) silver plated steel parts, using water and pumice stone abrasive. The "Butler" finish thus produced is sprayed with Zapon pearl lacquer (tinted) to produce the desired color and shade. To preserve the exact "Butler" finish, the hardware parts are sprayed with Maas and Waldstein 93D clear lacquer. Some of the colored finishes secured over a "Butler" base are called "Rose Beige", "Nile Green", and "Champagne". A "gold tone" pearl lacquer may also be used over a wet scratch brushed silver surface.

An "Onyx" shade is produced on a copper plated and oxidized surface by "highlighting" the parts on a wire brush, using water but no pumice. Figure 3 is a view of this operation. Clear lacquer is applied to the brushed and dried parts.

A "Chromatic Silver" finish is produced by oxidizing the silver plate to iridescence, then wet brushing with pumice stone to highlight the surface, drying, and spraying with a clear lacquer. Darker shades produced in a similar manner, but with a more extended oxidizing process, are called "Silvertone", "Imperial", or "Gun Metal".

Different effects are produced when oxidized surfaces are "highlighted" on a loose buff wheel instead of a wet wire brush. Figure 4 is a view of that operation. Clear lacquering is employed as the final coat in this process also.

Belmont finish technicians regularly process parts in seven or eight different reproducible shades. The same colors may be produced by oxidizing either copper or silver, the length of the immersion dip determining the shade in each case.

Finishing Casket Shells

Casket shell sections are spot welded together to form the complete assembly. Seams are soft soldered and surfaces are smoothed with 36, 60, and 80 emery sanding discs, using rotary sanders. Lids are fitted and assembled, and the assembled casket is cleaned with a steam gun and a solution of Turco cleaning compound. A pre-paint phosphatizing solution is next brushed on and allowed to dry for 20 minutes.

Fig. 5 — Sanding the primer-surfacer coat on Belmont caskets.

A primer-surfacer (M & W 23005) is next applied and permitted to air dry. Seams and all critical surfaces are smoothed, filled, dried ½ hour, and spot sprayed as necessary. The shells are next baked for 2½ hours at 240 deg. F. in a large gas-fired oven.

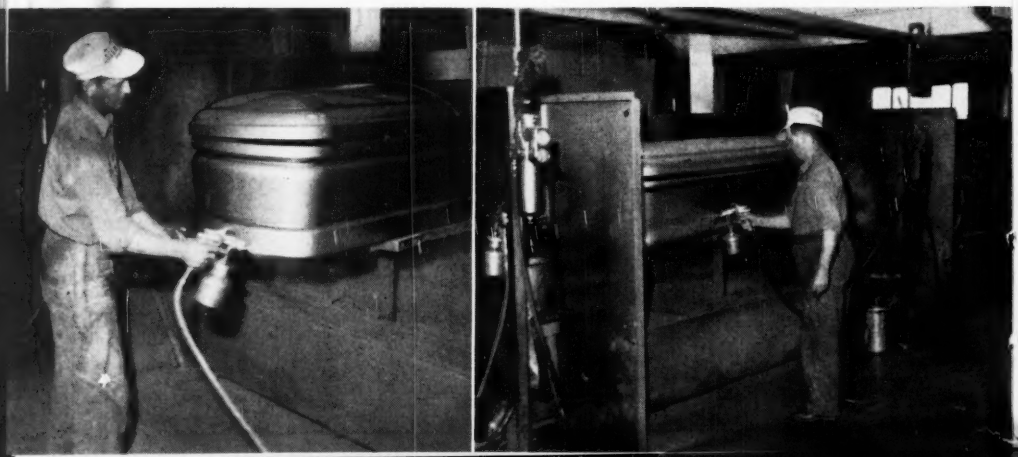
Following the baking operation, the surfaces are sanded with dry Durite 180 and wet Durite 220 sandpaper, employed in National Air Sanders. Figure 5 is a view of one section of the sanding room.

The sanded surface is next carefully wiped with tack rags, and sprayed with a full coat of gray primer. After air drying, the primed surface is wet sanded with Behr-Manning Speedwet 320 to produce a surface suitable for finish coating.

Casket finish coats consist of coats of metallic, colored lacquer, and clear lacquer. Shading lacquers are applied to produce various effects. Such colors as Interchem Opalescent Bronze, Imperial Silver, Rose Beige, Suntan, Natural Copper, Persian Silver, and Taupe Bronze are applied.

The spray room for final finishing is supplied with filtered air, under

Fig. 6—Caskets are mounted on swiveling pedestals for finish coat spraying. The pedestals can be moved vertically at will through the action of an air cylinder.



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Processes range from chrome to cadmium plating; parts include combustion chamber liners, turbine shafts and many other smaller units requiring various surface finishes. Proof of the effectiveness of the long-wearing protective finishes applied with Udylite equipment is found in the fact that Pratt & Whitney's J-42 Turbo-Wasp jet engines are flying 1,000 hours between overhauls.

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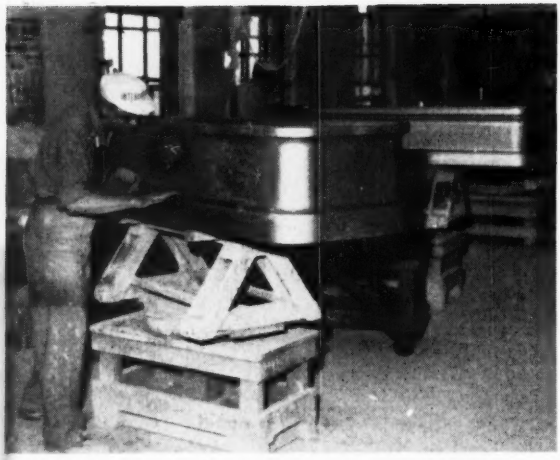

Fig. 7—A view of the rubbing room where the final high luster is applied to casket surfaces. (*All photos by PRODUCTS FINISHING*)

slight pressure, and is equipped with 5 DeVilbiss down-draft spray booths. Figure 6 shows two views of the spray booths and spraying operation.

Following the application of the required basic lacquer finish coat and three coats of clear lacquer, caskets are allowed to air dry and are then rubbed down by hand, using 360 or 400 sandpaper.

Next, using rubbing compound and sheepskin wheel, the surface is smoothed carefully. Last, metal polish is used to secure the final luster. Figure 7 shows a finisher rubbing a lacquered casket.

Final assembly operations on caskets include lining operations, for example, and the attaching of trim and hardware, and final inspection. Many other finish effects can be, and are being produced at Belmont, the number and variety determined entirely by demand. However, the finishing methods discussed in this article are used for the bulk of Belmont's production of lead coated steel caskets.

The Hot Spray Method of Finishing Passenger Car Bodies

By J. B. WIESEL
Hercules Powder Company

THE finish put on an automobile is important—perhaps the most important part, pound for pound, of all of its many components.

The finish is important because: color sells the car; protection assures long service life. And the choice of the most economical finishing method is even more important.

Today, approximately one-half of America's new car production is finished with nitrocellulose lacquer. Previous to 1920 all automobile bodies were finished with varnish. Quick drying lacquer revolutionized the finishing of automobile bodies.

About 1934 the baked enamel finish started to make serious inroads into the position dominated by lacquer, chiefly because cold lacquer always has required extensive polishing and rubbing for finest results, as well as

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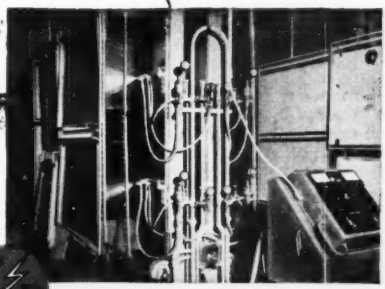

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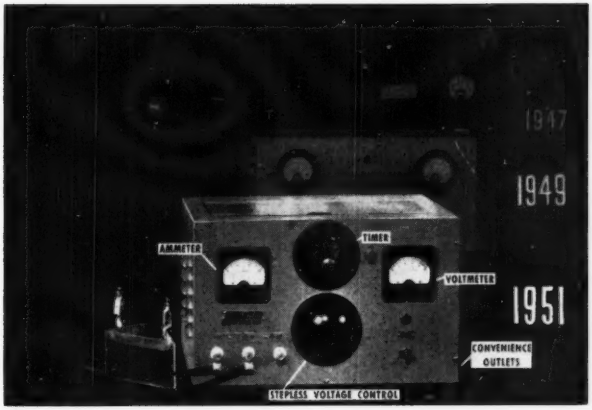
multiple coats of application. In the adoption of the baked enamel finish some sacrifice was made as to showroom appeal and the loss of the high quality finish obtainable from a rubbed surface, but with a gain in reduced application costs and no rubbing.

One of the principal drawbacks to lacquer has been the limited solids applied per coat, as compared to those deposited per coat of synthetic enamels. An early approach to, and solution of this problem was made some years ago by building up the solids content by specific formulation. And, during the past ten years, the solids content of the average lacquer has been increased rather markedly. Today, some manufacturers actually advertise 35 per cent high-solids clear lacquer for specific purposes, and most cold lacquers will vary from 20 to 30 per cent solids at the gun.

The hot spray process takes the idea of increased solids one step further. In this process, reduction to spraying viscosity is achieved by heating the lacquer to approximately 160 deg. F. instead of depending entirely on the use of thinners. There is no particular safety hazard involved in heating and spraying lacquer at 160 deg. F. The safety precautions are the same as for cold spray lacquer. Basically, there is no difference in the quality of finish, or in composition of solids, between hot and cold-sprayed lacquers. The solvents, however, are different, fast evaporating solvents are almost eliminated, the solids applied are higher, and the number of coats are correspondingly fewer.

This development, first investigated in the late thirties, has been thoroughly studied by many interested organizations, but until recently the lack of adequate mechanical methods for economical application made the hot spray process of little interest. Now, spray equipment and heaters are available with which heated lacquers can be ap-



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plied with maximum efficiency and economy. And, in this connection, the Commercial Solvents Corporation, holder of the basic patent for the hot spray lacquer process, is to be commended for its vision and interest in dedicating the patent to the public in order to further the development of this method. It behooves the automobile industry to take another look at hot lacquer because this process brings the cost of applying lacquer into approximately the same range as applying synthetic enamels, and thus makes many of the advantages of lacquer available with greater economy than was heretofore possible.

Improvements in Lacquer

Even with respect to the material itself, hot lacquer today is not the same as it was in 1939, or even the same as last year. Let us review briefly the things that have been done by the industries to make it better.

Pigments have been improved. Maroons are more permanent. Blues show less bronzing. Creams from new organic yellows don't fade. And, with rutile TiO_2 and aluminum powder, chalking is virtually eliminated.

Resins have been improved. Today's specially-designed lacquer resins feature extreme sunlight stability, water resistance, and weathering qualities, plus complete (not marginal) compatibility.

The film-forming ingredient itself has been improved by constant research and by adoption of advanced production methods.

Today's nitrocellulose is better in quality, and lower viscosity grades have become standard. This means higher solids at the gun—fewer coats —lower costs—longer service life.

The way that lacquers are put together has been greatly improved. New solvents, new solvent combinations, and new knowledge of solvent

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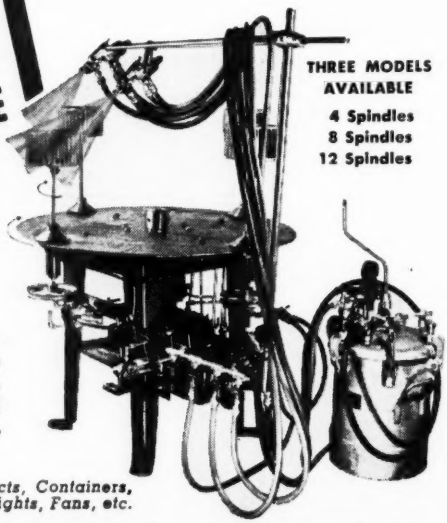

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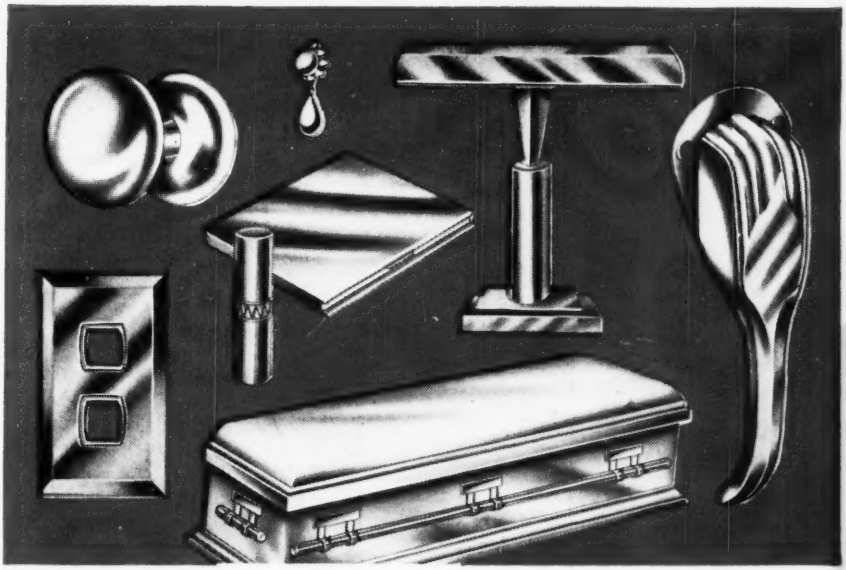

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behavior have led to easier application at lower costs.

What Lacquer Can Offer

A number of advantages in the use of lacquer, of particular interest to the automobile industry, can be cited.

Lacquer is the FASTEST drying finish. Dirt pickup is held to a minimum while the film is drying, and mar resistance develops almost immediately. Little trouble from overspray is experienced. No baking is needed; but force-drying at low temperatures can be employed for economies of heat and time. Two-tone jobs can be finished without intervening bake and wait.

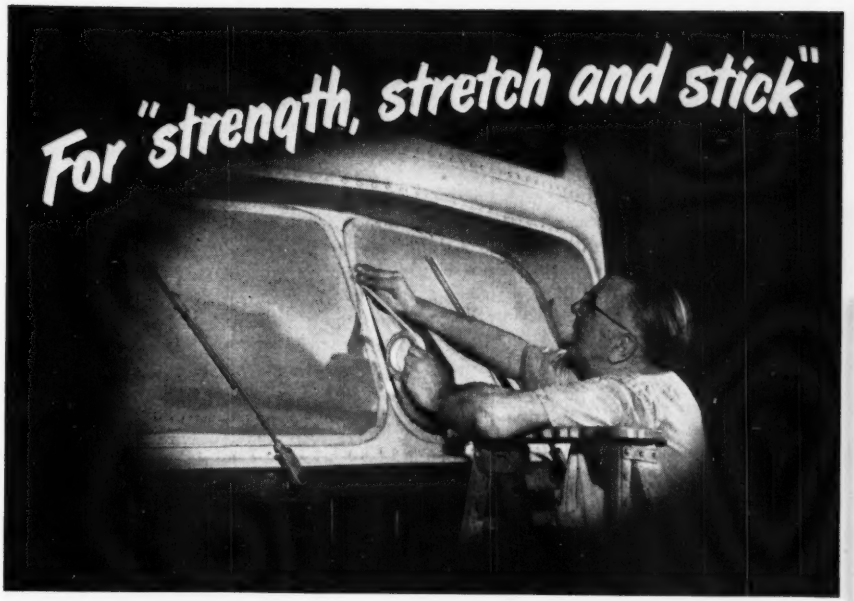
Lacquer is the easiest to use because: special colors and metallic finishes impose no limits; color standards set up by stylists and designers are easily attained in full production; touchup is easy, even after glass, rubber, and so on, are installed; rejected parts can be "spotted" perfectly, no need for complete refinishing; lacquer solution is more stable in storage—whether in pressure tanks, in the spray system, or in other containers.

A lacquered car has an enhanced showroom appeal. It has brilliant color and depth. Lacquer lasts longer; its original luster, even after long usage, comes back merely by polishing. Repairs are quicker; minor touchup jobs are less costly.

The hot spray method of application produces all of the advantages outlined above, obtainable with cold lacquer, plus the following:

1. Solids are higher and the thickness obtained for each pass is greater. When the lacquer is warmed or heated, the gun can spray it at higher concentrations. A lacquer, which at room temperature cannot be sprayed above 21 per cent solids, can be sprayed at 30 per cent solids when heated.

2. Solvent waste is lower. Obviously, this higher per cent of solids means that less solvent is needed. A typical



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lacquer at 21 per cent solids uses 3.76 pounds of solvent for each pound of solids. At 30 per cent solids, only 2.33 pounds of solvent are used for each pound of solids.

3. Coverage per gallon is increased. If one gallon of lacquer, applied cold, will finish 100 units, then one gallon of the same lacquer sprayed hot, using a different solvent composition, will finish, theoretically, 143 units (with the same thickness of film).

4. Fewer coats are needed. Frequently three coats are required to obtain sufficient finish to beautify and protect a product. Experience has shown that by spraying hot at higher solids, two coats can give the same satisfactory amount of finish.

5. Capacity of the finishing plant can be increased. Reduction in number of coats from three to two is equivalent to adding 33 per cent extra capacity (which for cold lacquer would mean one-third more floor space, more guns, more operators, more compressor capacity). Similarly, reduction of a two-coat finishing schedule to a one-coat schedule, which frequently is possible, is equivalent to adding 50 per cent to the existing finishing capacity.

6. The finish has better flow-out. All existing evidence indicates that heavy films flow out better than thin ones. The hot spray technique not only makes heavy films possible, but encourages this. There is a natural tendency to apply heavy coats, as a result of the inherent higher solids content.

7. The finish has less tendency to sag. Lacquers applied hot, at correspondingly higher solids, have less tendency to sag than lacquers thinned for applying at room temperatures. For example, one lacquer applied to a vertical surface at room temperature sagged when a film thicker than 0.001 inch was applied. The same lacquer solids, applied at 160 deg. F. in a hot spray solvent formulation, did not sag when 0.002 inch of film was applied.

8. Blushing is eliminated. In some areas, blushing is a major problem, particularly during humid weather. Moisture condensing on the freshly sprayed lacquer droplets as they are cooled by the rapid evaporation of solvent clouds the film. When lacquer is sprayed hot, instead of at room temperature, it is virtually impossible to create a blushing condition.

9. Higher viscosity raw materials can be used in formulating hot spray lacquer, thus providing lacquer films with improved physical properties, such as tensile strength and toughness.

10. The color and heat stability of automotive type lacquer are excellent for hot spray application.

11. One more final reason for considering hot spray lacquer today is that it is a method of conserving finishing materials. Like everything else today, most lacquer ingredients are in

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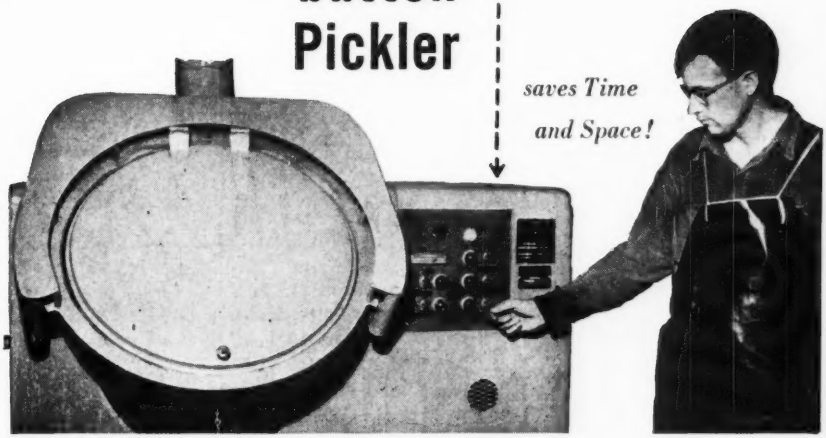

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Table I

	Cold Lacquer	*Hot Lacquer*	*Synthetic Enamel*
Application	3 double coats; generally forced dried at 180 deg. F. for 20-40 min.—easily spot repaired and touched up.	1-2 double coats; probably needs slightly longer force drying than cold lacquer—easily spot repaired and touched up.	1-2 double coats; generally baked at 250 deg. F. for 45-60 min.—cannot be spot repaired. Entire panel must be refinished.
Appearance	Excellent; cold lacquer finishes require polishing; when properly rubbed and polished; fullness, depth and texture are excellent.	Good to excellent. Unrubbed finish approximates baked synthetic enamel. Light polishing develops finish equivalent to polished cold lacquer.	Fair to good without rubbing. Has high gloss but orange peel is inherent and cannot be rubbed out without considerable effort and expense.
Outdoor Durability	High quality hot spray lacquer, cold lacquer and baked synthetic enamel finishes have the same durability.		

short supply. Experience shows that lacquer applied by the hot spray process covers more square feet of surface per gallon.

A comparison between hot lacquer, cold lacquer and baked enamel finishes is outlined in Table I.

It is significant to note that in the application of the finish where labor costs are high, hot lacquer and synthetic enamel are comparable, whereas the cost of applying cold lacquer is higher, due to the excessive number of application coats required and the need of final polishing to remove orange peel. Hot lacquer still shows slightly higher material costs than synthetic enamels, but these are more than offset by the added ease of touch-up, reduced time, and lower force drying temperature.

It must be expected in a new development such as this that many important problems remain for final solution. However, it is our firm belief that the basic advantages offer sufficient economies to warrant serious consideration on the part of each and every automobile producer. We would remind you of the many difficulties encountered years ago when cold lacquer was introduced to take the place of varnish. It required much persistent experimental work to eliminate all of the early difficulties. The successful adoption of hot lacquer may follow the same pattern. Again let us point out that such trial and error periods have been successfully passed through in other industries where, as a result, the number of those converting their finishing operations to the hot spray lacquer process is rapidly growing.

●

(Adapted for PRODUCTS FINISHING from a paper presented before The American Society of Body Engineers, Incorporated.)

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Plating to Meet Today's Conditions

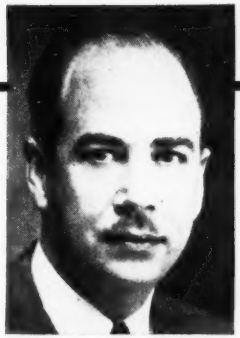
By MYRON B. DIGGIN
Technical Director, Hanson-Van Winkle-Munning Company
Matawan, New Jersey

INDUSTRY today, especially the finishing industry, is beset with the confusion always associated with the necessity of making rapid changes in production planning. With restrictions on the procurement and use of nickel, copper, tin, cadmium, and with metals and salts difficult to obtain, many processing methods have been altered. The availability of materials for permitted uses is also a large and variable factor in planning present and future production.

In the automotive industry, before N.P.A. orders were clarified, plans were being made to substitute semi-bright or bright zinc plating on steel parts followed by buffing or coloring, passivation in a chromate dip and then protecting the zinc surfaces against tarnish and corrosion with hard baking clear enamels. When the government orders were modified permitting copper to be used as an undercoating for chromium, the wholesale conversion to zinc plating did not develop. At the present time, automobile bumper bars, tubular metal furniture and similar articles are being plated with 0.0005-0.001 inch of copper (preferably bright), given a light coating of nickel, where stocks still exist, and then chromium plated to the usual commercial thickness. Some manufacturers of household appliances are applying several times the normal thickness of chromium where the latter is applied directly to copper.

Chromium over Copper

Chromium applied directly on copper has been used on appliances and certain lines of plumbing goods for a number of years and has given satisfactory service for these applications. The lower throwing power of chromium in comparison with nickel has made it imperative to give considerable attention to racking and to the choice of a suitable copper plating process. It has been found that a full bright, leveling copper deposit with an active surface is more completely covered with chromium than ordinary copper deposits. The recently modified cyanide copper PR system permits a remarkable degree of chromium coverage in comparison with other coppers. Production tanks are now being operated in the industry using bright acid copper and electropolished acid or cyanide copper as a base for chromium. Interest has been reawakened in the use of modified nitric-sulfuric-hydrochloric acid bright dips, chromic acid dips and other chemical polishing solutions to prepare the surface of copper for subsequent chromium plating. To overcome deficiencies in chromium coverage in recesses and around holes, a thin nickel flash is being used wherever possible. The thickness of the nickel flash currently being applied to a wide variety of items is only 0.00005 inch. Tests have shown that an equivalent thickness of PR copper



MYRON B. Diggin graduated from Wesleyan University in 1926, receiving a B. A. degree and in 1928 was awarded an M. A. Degree from the same university. His work in the electrochemical field began in 1930 when he joined the Hanson-Van Winkle-Munning Company as a chemist. In 1933 he was appointed Chief Chemist and in 1946, Technical Director.

Mr. Diggin's researches have resulted in a number of patents, developments, and designs in the electrochemical field. He is the author of numerous articles and has lectured extensively throughout the country. In 1946 he was awarded the American Electroplaters' Society's Gold Medal. He has served for several years as Associate Editor of A. E. S. publication PLATING and served as president of the Newark Branch of the A. E. S. last year.

He has been active on A. S. T. M. committees, is a member of the Electrochemical Society, American Chemical Society, American Ordnance Association, and the Electrodepositors Technical Society (England).

may be substituted for the nickel previously used, obtaining approximately the same corrosion protection of the base metal. Under some conditions of indoor exposure and normal outdoor exposure, there may be bleeding of the copper corrosion products through the network of cracks in the chromium; however, the corrosion products can be wiped off to restore the original appearance of the article.

For applications where nickel is permitted by government regulations, such as car bumpers and door handles, it has been found possible to replace at least 70 per cent of the nickel formerly used with copper and still obtain as good, if not better, corrosion resistance than the all-nickel undercoating. Both accelerated salt fog tests and outdoor exposure indicate that a steel article, plated with 0.0007 inch PR copper, 0.0008 inch of nickel plus the usual chromium deposit, resists corrosion better than a straight 0.0016 inch of organic bright nickel with the usual chromium flash. As the PR copper percentage of the total coating is increased up to at least 75 per cent, the number of corrosion spots decrease in comparison with the all-nickel coatings.

Chromium on Steel

Chromium is being applied direct to steel on a number of items. At a large typewriter plant, parts were formerly plated with 0.00075 inch of nickel followed by 0.000010 inch chromium to withstand a 90-hour salt fog test. Following the procedure used on steel mess trays during the last war, these parts are now cyanide case hardened, and two and one-half times the amount of chromium applied direct to the steel surface, with a resulting performance of 78 hours in a salt fog test. To obtain this performance, the steel must be cyanide hardened—not furnace hardened. When chromium is applied directly to mild or furnace-hardened

steel, the deposits lack "snap" and often must be colored on a wheel for an acceptable appearance. The corrosion resistance of chromium on this type of steel is rather low and, because of the poor throwing power of chromium solutions, there are many bare areas on articles of complex shape. These areas naturally have no resistance to corrosion.

Bright Zinc

Because of government restrictions on the use of cadmium plating, many conversions to bright zinc have been made. It is the plater's good fortune that a number of excellent bright zinc processes, producing bright and lustrous deposits, are now available. To increase the protective value of the deposits, to minimize staining and to retard the formation of white corrosion products, excellent chromate passivating treatments are available and are being used to an ever-increasing extent. There is also increasing use of baked synthetic lacquers and enamels that protect brightness and give increased wear resistance to the attractive bright zinc surfaces. While it is realized that the combination of bright zinc, either buffed or unbuffed, passivated and lacquered, may not have the hardness, abrasion resistance and durability of the conventional nickel-chromium deposits, nevertheless, it has been found a satisfactory substitute finish for many articles. Such substitute finishes can be applied conscientiously and well, or on the other hand, in a slovenly manner that will lead to poor durability. The latter type of finishing will serve only to bring the plating industry into disrepute.

The application of chromium deposits directly to bright zinc surfaces has not had wide acceptance. Although chromium can be applied directly over bright zinc, especially when a suitable chromate bright dip is employed, there

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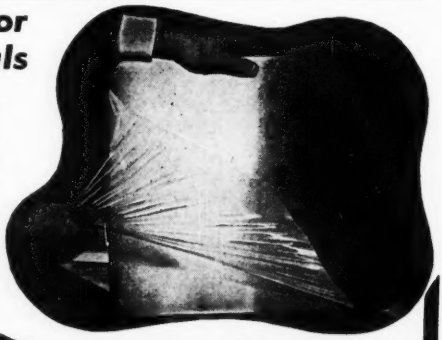

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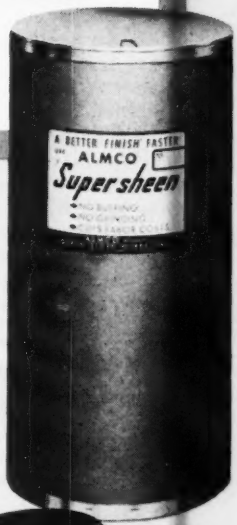

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is a tendency for the deposits to be milky or frosty in appearance, making necessary the costly color buffing of the chromium.

Silver Plating

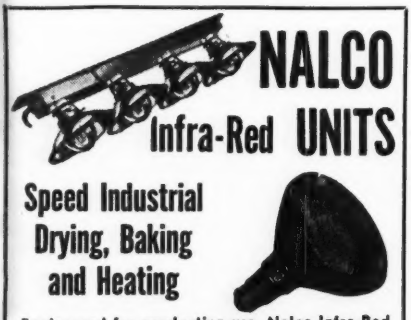
With the defense program being accelerated during the coming year, the metal supply situation, as it affects plating, is uncertain. Silver is one metal which exists in this country in surplus quantities. A corporation in New Jersey has developed a new process for electroplating silver on steel wire and rod. It is substantially the same as the development by the same corporation about six years ago for nickel plating wire economically. After several months of experimentation and tests, the corporation has produced several million pounds of silver coated steel rod and wire, most of it going to manufacturers of consumers' goods. It is stated by the producers that the finished silver plated object costs no more than any article coated with a conventional finish. Because of improved plating methods and control, unusually small amounts of silver will produce a protective coating.

Aside from its increased cost over the more commonly used metals, silver has not found favor for application to mass produced consumer goods because of its tendency to tarnish and, from the producers' standpoint, the fact that even the so-called "bright" solutions do not produce silver deposits that were actually bright enough to eliminate buffing. A new bright silver process was announced in July 1951 and is now being used widely. To obtain a pleasing white and bright finish, thin coatings of silver can be applied from the new bright solution and then protected with a hard transparent baking enamel. Bright silver applied directly to steel may lack adhesion and does not develop full brightness; however, when deposited over a thin flash of copper, the luster is high and the adhesion is excellent.

Alloy Plating

Several months ago it was thought that alloy plating might be used as a substitute for other coatings. At the beginning of 1951 several manufacturers converted from nickel to the 80 per cent tin—20 per cent zinc alloy deposit which has enjoyed a wide popularity in England as a substitute for cadmium or zinc. The deposits were found to be equivalent to cadimum for corrosion protection and they were easily soldered, a feature that is important in the electronics industry. Restrictions on tin have held back the use of this alloy deposit except for important defense applications. Similarly, the bright alloy deposit of copper-tin-zinc, producing pleasing white and bright deposits, is limited almost to essential electronic applications.

"White brass" solutions depositing an alloy of approximately 80 per cent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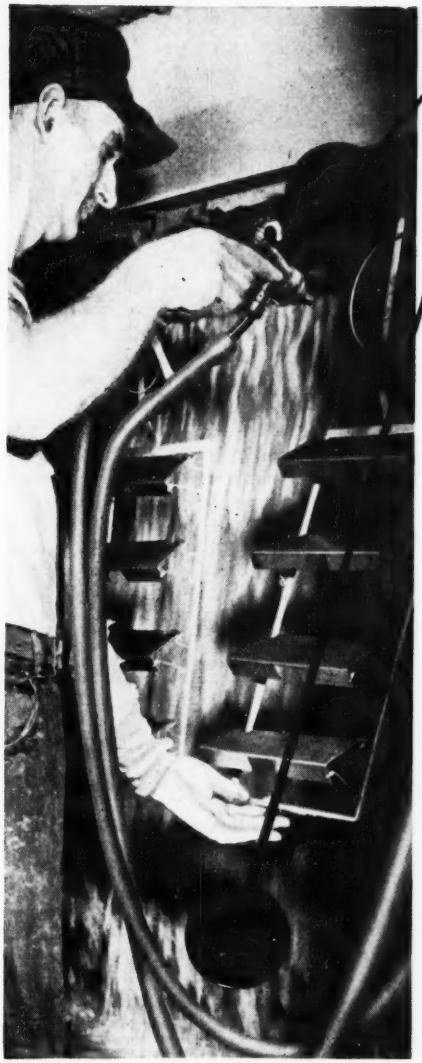

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If your spray booths are of the water curtain type . . . and if your production schedules demand continuous booth operation . . . Pennsalt's new PB-1 may be the superior waterwash compound you're looking for.

When you use Pennsalt PB-1 at concentration ranging from 1/10 to ½ oz./gal., room temperature, you'll notice these advantages:

1. **The great bulk of the overspray floats on the solution surface, easily removed in a non-sticky mass.**
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Thus, your PB-1 waterwash solution means minimum downtime for maintenance and cleaning. In addition, it keeps the overspray material in excellent condition for profitable reclamation, if that should be a factor in your operations.

Pennsalt PB-1 is a highly alkaline, anhydrous, free flowing, dedusted material containing special non-foaming agents. It is economical both in first cost and in long-run operation. Because paints and booth designs are so varied, we invite you to outline your set-up in detail so that we can give you the most practical solution with the least lost motion. Metal Processing Dept., Pennsylvania Salt Manufacturing Company, 1000 Widener Bldg., Phila. 7, Pa.

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A Better Start for Your Finish

zinc—20 per cent copper have been installed in a number of plants as a substitute for nickel. This alloy deposit can be chromium plated directly without intermediate flashing. Because of the intrinsically brittle nature of alloys of this composition, however, difficulties are experienced when an attempt is made to produce moderately heavy deposits for increased corrosion protection.

The tin-nickel alloy deposit, developed in England where one commercial installation is in operation, is of academic interest only at the present time in this country because of limitations on the use of both of the alloying constituents.

Iron Plating

There are several trends in the industry which are worth mentioning. Electrolytic iron deposits have been substituted for copper and nickel deposits. Many manufacturers of record stampers have turned to iron as a substitute for the all-nickel stamper or the composite nickel faced-copper backed stamper. The all-iron stamper is generally nickel faced for separation and subsequently chromium plated for greater wear resistance. Stampers of this construction have been in use for several months on a production basis and have proven to be entirely satisfactory. Many articles previously electroformed from nickel are now being made with electrolytic iron. Various decorative items of this type are buffed, chromium or rhodium plated or enameled.

One of the largest commercial printing organizations in this country handling a considerable volume of telephone directory work, makes use of iron plated stereotype plates. This organization runs consistently in excess of one million impressions from the iron plated stereos with no appreciable sign of wear. For this application, the

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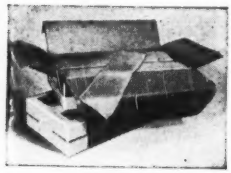
Cut off any size piece and use as needed.



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No matter which way you buy it, you can be sure that every square inch will *stay* SOFT and TACKY until the very last bit is used up.

The Cut Bulk size is 18" x 36"—folded to 4½" x 18" for easy handling. *All of our Tack Cloth is Spontaneous Combustion-Proof, Lint-Free and Wax-Free.* It's clean and sanitary—*there's no waste.*

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HOT Lacquer NEWS

PUBLISHED PERIODICALLY BY HERCULES POWDER COMPANY IN THE INTERESTS OF BETTER FINISHES AND FINISHING

Hot-Spray Lacquer Up to 50% Faster For Military Equipment Finishing

Douglas Reports Savings in Time and Materials Since Adopting Hot-Spray Method

Thinning lacquer by heat instead of solvents represents the most economical means of securing a fully satisfactory and serviceable finish. Douglas Aircraft Company proves this dramatically on its Navy AD-1's — built by its El Segundo Division.

Here are some cold facts about hot lacquer — verified by Douglas — worth evaluating against your present method of finishing. Comparable savings in time and money on finishing military equipment such as tanks, bombs, shells and grenades can be realized simply by switching to hot-spray lacquer.

- Required film thickness can be applied by one hot coat where two cold cross coats are necessary.
- Application time is reduced 50% with a resultant increase in production.
- Finish is smoother and glossier.
- Sanding between coats is eliminated.
- Better flow-out decreases tendency to sag, blush or orange peel.
- Equivalent of two gallons of lacquer and eight gallons of thinner saved on each plane.

HERCULES POWDER COMPANY
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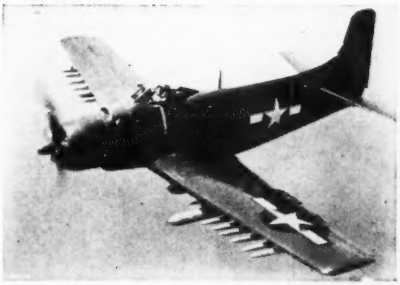
Cellulose Products Department
927 Market St., Wilmington, Delaware



This AD-4, built by Douglas for the Navy, is one of hundreds on which hot-spray lacquer is used to cut finishing costs and time.

You'll want to read all about the broader uses of hot-spray lacquer as it applies to finishing defense items—and your own products. A new military specification for hot lacquer is now issued and official. Identified as "Military Specification MIL-L-11195 (ORD) Lacquer, Lustreless, Hot-Spray (For Ammunition)." Hercules will send you full information on hot lacquer, types of heating equipment available, and the performance record of hot lacquer in many industries. Send for it today.

CL52-1

ferrous sulfate-ammonium sulfate-boric acid solution is used at a temperature of 110-120 deg. F. For plates to be used on short runs of approximately 200,000 impressions, the stereoplate is left in the bath for 15 minutes at 20 asf; for longer runs in excess of one million to 1½ million, the plating time is increased to 25 minutes. The printing is done directly on the iron surface. Other stereotypes are employing the ferrous chloride-calcium chloride bath operated at 190-200 deg. F. The deposits from this bath have greater ductility.

Anodizing

In the light metal field, our defense needs have increased the volume of anodizing on aluminum by both the chromic acid and sulfuric acid processes. Many commercial products appeared last year and the first part of this year having bright anodized and dyed surfaces. This treatment is a variation of sulfuric anodizing wherein the aluminum work is bright dipped, given a relatively short (5-7 minutes) anodize instead of the customary 40-minute treatment, then dyed to give beautiful clear colors with a metallic sheen. Various refrigerator parts are treated in this manner.

A development of interest is the new die casting aluminum alloy which remains light in color during anodizing and therefore can be dyed successfully to light pastel shades.

Many aircraft plants are chromic acid anodizing certain parts with only a 5-minute treatment. This short treatment produces an ideal film for subsequent painting. For less severe applications, aluminum is given a dip in a chromic acid solution. Another development is the use of cadmium plating on aluminum in place of anodizing to meet government specifications AN-QQ-629 calling for 250-hour minimum salt fog test.

Two modifications of the aluminum anodizing procedure have been announced recently for producing extremely hard and abrasion resistant coatings on aluminum. The phenomenal wear resistance of these coatings makes possible the use of lighter aluminum in place of hard chromium plated steel.

Miscellaneous Processes

In the field of chemical dips for producing a protective film on aluminum surfaces, there have been a number of new dips developed since the past war, all of which increase corrosion resistance and form an excellent base for subsequent painting. A new protective chemical treatment for aluminum is in development which will make possible the application of a conversion film by a five-minute spray operation in contrast with the present 20-minute immersion required with most of the processes.

There is an increase in the applica-

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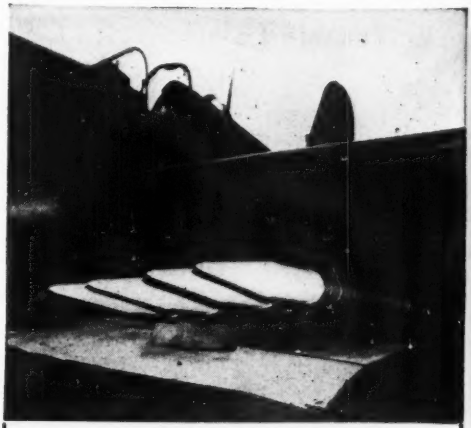
Technical Service Data Sheet
Subject: IMPROVING PAINT ADHESION ON STEEL WITH GRANODINE®

INTRODUCTION:

"Granodine" is a zinc phosphate coating chemical which improves paint adhesion on steel, iron and zinc surfaces. In the easily applied Granodizing process, a non-metallic crystalline coating is formed on the treated metal. This bond holds and protects the paint finish and thus preserves the metal underneath. Parts can be either Spray Granodized in an industrial power washing machine, Dip Granodized in tanks, or Brush Granodized with hand equipment.



Official Dept. of Defense Photograph

An F4U Corsair with the Navy's new aircraft anti-tank rocket, the "RAM". A Grade I zinc phosphate finish (JAN-C-490) protects the entire external surface of this rocket and provides a durable bond for the specification paint finish.

"GRANODINE" MEETS SERVICE SPECIFICATIONS:

The protective "Granodine" finish meets Grade I of JAN-C-490 and equivalent requirements of:

JAN-F-495 U.S.A. 57-0-2C, Type II, Class C U.S.A. 51-70-1, Finish 22.02, Class C.

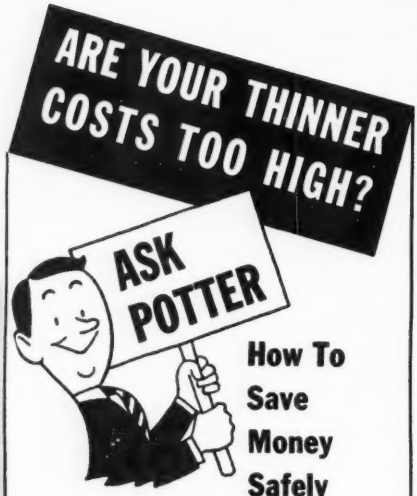
MANY APPLICATIONS:

Automobile bodies and sheet metal parts, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, tanks, trucks, jeeps, containers for small arms, cartridge tanks, 5-gallon gasoline containers, vehicular sheet metal, steel drums and, in general, products constructed of cold-rolled steel in large and continuous production are typical of the many products whose paint finish is protected by "Granodine" zinc phosphate coating.

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "GRANODINE" AND YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES



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tion of hard chromium to aluminum. As an example, a coating of up to 0.050 inch of chromium is applied to the inside of cylinders for auxiliary aircraft and portable engines. Chromium is also used extensively on aluminum rubber molds. The chromium for these uses is applied by first treating aluminum by the usual zinc immersion treatment followed by a 2-minute copper strike with the chromium applied directly to the copper.

The anodizing of magnesium for protective purposes is again coming to the forefront for military uses. In addition to the older galvanic anodize method and the Manodyz Process developed during World War II, a new process known as the HAE was announced recently by the Frankford Arsenal and is available for use on military material by special permission.

There has been an increased demand for plated plastic articles because of metal shortages in the civilian line, and because of greater use in the military field on electronic devices. An outstanding development is a plastic molding material which is conductive, and which can be electroplated directly without first applying a conductive coating. It is stated that the raw material can be converted into the desired finished product by molding in hardened steel dies under heat and pressure in the same manner as all thermosetting phenolic molding compounds. The adhesion between the conductive plastic and the plated metal is said to be exceptionally good and the rate of deposition high.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

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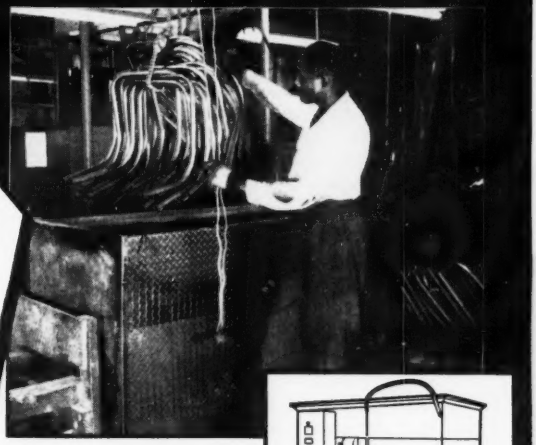

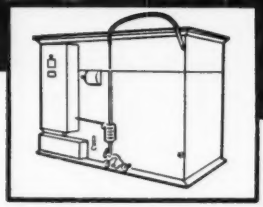

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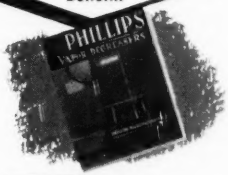

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ALOXITE TPT **Aluminum Oxide**	Tough, sharp. Grits 16 through 100.	Polishing operations involving removal of large amounts of metal (e.g. plowshares).
ALOXITE TPL **Aluminum Oxide**	Very sharp, friable. Grits 16 through 220. (It fractures during use, thus reduces loading of the wheel surface).	Polishing low tensile strength metals—copper, brass, bronze, aluminum.
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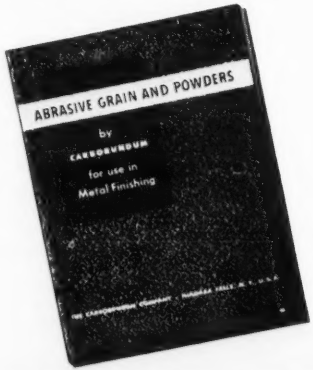

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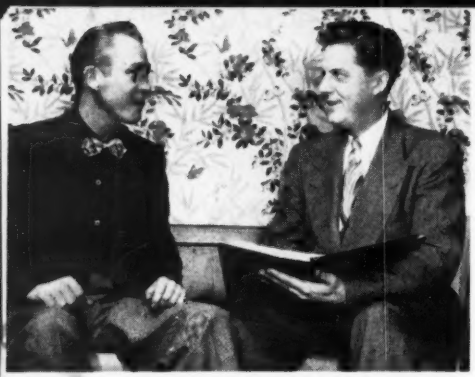

Fig. 1—Carl F. Hansen (left), Advance Tinning Company, Chicago, gets first-hand instruction from J. Robert Greenwell, Chrome-Rite Company, Chicago, whom he succeeds as chairman of the Chicago Electro-Platers Institute. Greenwell served as chairman during 1950 and 1951.

MEET THE CEPI

RECENTLY the **CHICAGO ELECTRO-PLATERS INSTITUTE** celebrated its sixteenth anniversary. The CEPI is a trade association whose membership is comprised of owners and managers of ninety-two job shop electroplating and polishing firms. Established in 1935 when twenty-six Chicago shops banded together to form the nucleus of an effective trade group, the organization has grown in territorial strength as well as in members. The present membership includes job shops in Racine, and Milwaukee, Wisconsin, as well as plating establishments in Freeport, Illinois, and Chicagoland suburbs such as Cicero, Oak Park, Wilmette, Maywood, Arlington Heights, Riverdale, and Zion.

The Chicago Electro-Platers Institute enjoys an unique distinction in the trade association field. Through its accomplishments it has brought recognition to its members and to the entire electroplating industry. Primarily a local management group, the CEPI has joined with the American Electroplaters Society, the National Association of Metal Finishers, and others in fostering industrial research projects and in improving the technical "know-how" of electroplating personnel.

One of the important functions of the organization is to serve as a collector and disseminator of information concerning operating costs, wage costs, production problems, legislative data and government controls. Monthly credit reports, wage surveys, availability of supervisory personnel and equipment are some of the activities initiated in recent years.

Executive offices and an administrative staff are maintained at 35 E. Wacker Drive in Chicago's loop. The CEPI carries on a year-round program under the direction of its elected officers and eight members of the board of directors. Officers for 1952 are: Carl F. Hansen, chairman; Lawrence Hay, vice chairman; J. M. Westergaard, Metal Processing Company, sec'y-treas. Directors for 1952 are: J. Robert Greenwell, Chrome-Rite Company; Herbert E. DeGrenier, Grand Plating Company; Edward Fell, Atlas Plating Company; Robert L. Giesel, Adolph Plating Company; Emil Van Steen, Modern Plating Company, John Lietz, B. Mercil and Sons Plating Company;

Charles Jensen, Jensen Plating Works; and John Vermeyen, Crescent Plating Works. Legal Counsel of the CEPI is Austin E. Torney.

The "clearing house" activities of the CEPI have been greatly broadened since the start of hostilities in Korea and the advent of the National Production Authority. Housed in CEPI files are Armed Forces specifications to which member firms refer daily. Data on bids and awards of prime contracts are also assembled and kept on file for the benefit of member firms. An extremely useful "business building" tool has been the annual publication of the Membership Directory. In addition to listing the names, addresses and business phone numbers of member firms, the directory lists the names of company principals and the committee assignments for the current year. A carefully prepared supplement allows member firms to list all the special finishes and special facilities that they have to offer. Hence, a job shop electroplater may be approached by a manufacturer to apply a metal finish for which he is not equipped. Through the Membership Directory, a plater can refer the customer to member firms who can supply the finish, or he may arrange through the directory to subcontract the job to another member firm. The executive office regularly receives direct calls from manufacturers and is in an ideal position to refer the work to its membership.

CEPI members attend regularly scheduled monthly dinner meetings. The officers and board of directors function as the program committee and provide speakers, illustrated lectures, symposiums, films and panel discussions on topics dealing with management phases of custom plating and polishing. The educational aspects of the program have proved beneficial to small shops and large shops alike. Free exchange of ideas and information between member firms, both at

Fig. 2—Typical board of directors meeting of Chicago Electro-Platers Institute. Seated left to right (clockwise) are: Emil Van Steen, Modern Plating Company, Chicago; James P. Malooly (partially hidden from camera), Western Rust Proof Company; Carl F. Hansen, Advance Tinning Company; J. M. Westergaard, Metal Processing Company; J. Robert Greenwell, Chrome-Rite Company; H. E. DeGrenier, Grand Plating Company; Austin E. Torney, legal counsel; A. J. Pavlis, Great Lakes Plating; George Westerberg, Jr., Mechanical Plating Company.
(Photos courtesy Chicago Electro-Platers Institute, Chicago 1, Illinois)

meetings and through the publications of the CEPI, is gradually bringing about the achievement of higher quality standards, cost reductions and the introduction of various management techniques.

In recent years, the introduction of "young blood" into the organization has stimulated the Institute's activity. Young men, many of whom are second and third generation members of family plating firms, have furnished the leadership and vitality necessary to project the electroplating industry into the industrial spotlight. Wilbur O. Zinn, National Plating Company, Chicago, who served as chairman in 1948 and as president of the National Association of Metal Finishers during 1949-1950, is one of these new leaders. Another is J. Robert Greenwell, Chrome-Rite Company, who has served the Institute as its chairman during 1950 and 1951. Under the leadership of Zinn, Greenwell, and many others, and with the cooperation of the NAMF, an Industry Advisory Committee for the Job Shop Electroplating Industry was set up in Washington, D. C., this year.

A newsletter, the "CEPI NEWS-BULLETIN," is published at least once each month and supplemented frequently by "FLASH BULLETINS" which keep members informed on current events affecting electroplating interests. The NEWS-BULLETIN also serves as a reporting medium for Institute business. Further, it lists equipment wanted and for sale, reports upon the activities of other trade associations, urges members to support local branches of the American Electroplaters' Society and the Supreme Society's Research Program, and even publishes "case histories" of problems dealing with establishing plating and finishing costs on a specific contract or job. Although a recent breakdown of dinner meeting attendance showed that 75 per cent of the membership is regularly represented at monthly meetings, the publication serves to keep all members informed and "on their toes."

Widespread participation in committee work is exemplified by the growth of the AES and NAMF Liaison Committees. The entire membership of these committees attended the 38th Annual Convention of AES at Buffalo.

Still another accomplishment in recent months has been the activity of the Group Insurance Committee. Members spent many weeks in investigating insurance programs made available by leading companies in the group insurance field. Final result was the formulation of a group insurance program wherein member firms having extremely small personnel complements can now participate in the CEPI Group Policy Program.

The future of the Chicago Electro-Platers Institute appears particularly bright. Its leaders and their accomplishments are attracting the interest of custom electroplating shops in other cities and in other states. Whereas the CEPI is primarily a local organization, its scope is steadily broadening into that of a regional group with close ties binding it to the national scene. With a record of growth and achievement behind it, the Chicago Electro-Platers Institute looks upon itself as a young, virile association that can contribute heavily in enriching the finishing industry of which it is a part.

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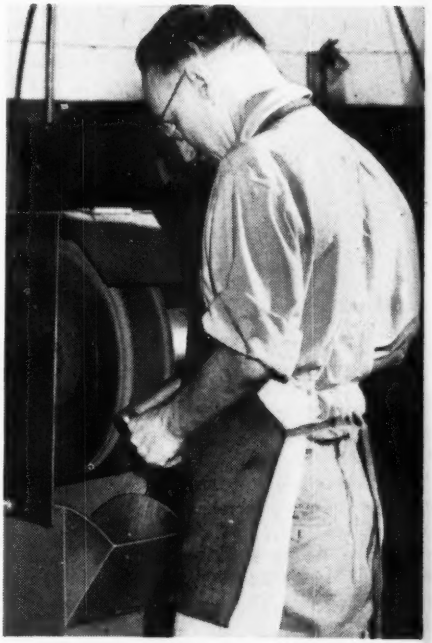

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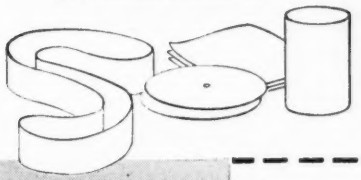

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Spotlighting FINISHING Progress

Impurities in Nickel Plating Baths

THE plater's ability to recognize difficulties due to impurities in nickel plating solutions and his knowledge of proper corrective steps will enable him to operate a more efficient shop. He must be constantly on the alert to minimize the sources of the impurities and if possible to identify and remove them before they can cause serious trouble. In times of shortages of plating materials it is more important than ever that baths be operated at optimum efficiency at all times. Valuable suggestions and practical pointers on how to recognize and remove impurities from nickel plating baths were given by A. C. Benning, Harshaw Chemical Company, in a talk before the recent Annual Regional Convention, Toronto (Canada) Branch, American Electroplaters' Society.

According to Mr. Benning, an impurity in a nickel plating bath may be defined as anything introduced in a suspended or dissolved state which has an undesired effect on the appearance or properties of the deposit, such as roughness, hardness, brittleness, dullness, poor corrosion resistance, pitting, adhesion, and poor efficiency. These impurities may be metallic ions such as chromium, copper, iron, zinc, aluminum, lead, and calcium or anions such as chromates, nitrates, silicates, and cyanides. Organic materials that may contaminate a

By DR. ALLEN G. GRAY

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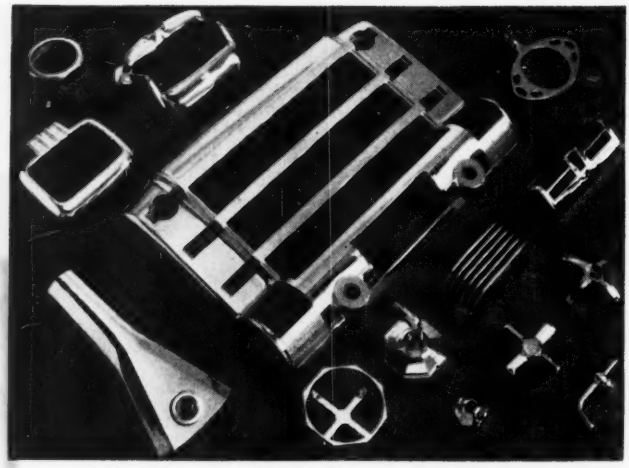

Fig. 1—Bright nickel plated parts. (*Photo courtesy The Harshaw Chemical Co., Cleveland 6, Ohio*)

bath are grease, buffing compounds, dust, solvents, sizing from anode bags, tank linings and organic material in the water used.

Sources of Contamination

Sources of contamination are often difficult to find, especially those of the organic impurities. Although the presence thereof is shown by the effect on the deposit, their removal is only a temporary relief unless the source can be found and eliminated to prevent continual contamination. Figure 1 shows a group of parts finished by bright nickel plating; Fig. 2 shows "black burn" of nickel deposit due to contamination of the solution.

Chromium contamination may enter a bath from plating racks that are used in both the nickel and chromium cycle without an anodic treatment in alkali before being put back into the nickel line. Chromium may also enter the solution as a chromic acid spray if the nickel tank is too close to the chromium tank, or by anodic action of stray currents on stainless steel filter parts and piping. Copper may enter the solution from parts dropped in the tank, bus bar corrosion products and from dragin from porous rack coatings. The major source of iron is from the parts being plated, if dropped parts are allowed to remain in tanks or if a bi-polar condition exists such as in the case of tubular material. In some instances iron may contaminate the solution from weld scale and oxide films on the backs or recessed area of deep drawn parts or

Fig. 2—"Black-Burn" of nickel deposit due to contaminated solution. (*Photo courtesy The Harshaw Chemical Co., Cleveland 6, Ohio*)

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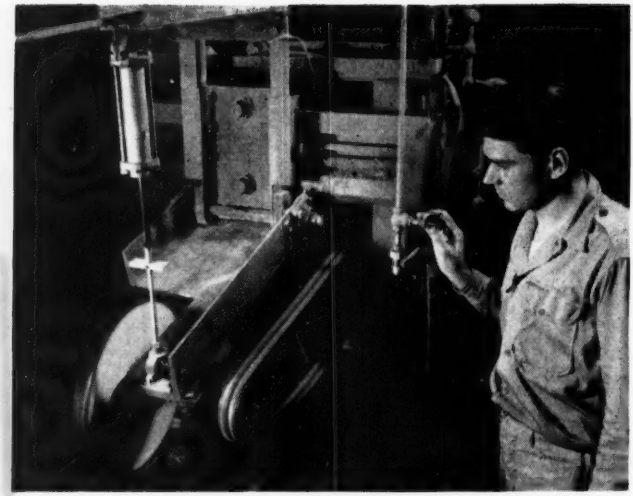


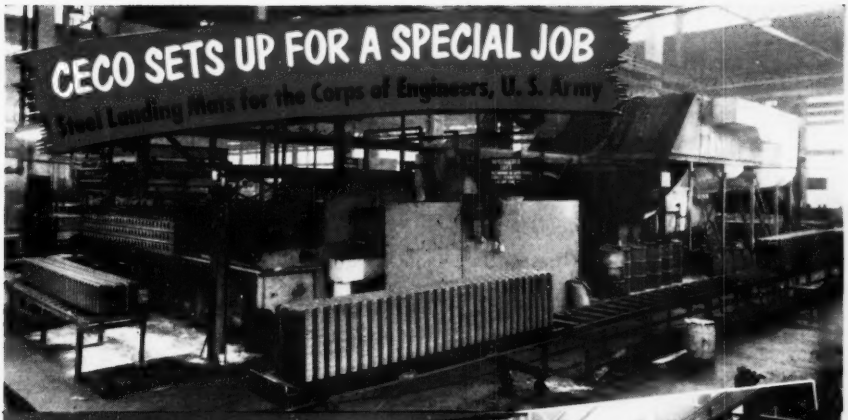
Fig. 3—Buffing evaluation machine used at Harshaw laboratories to determine the effects of impurities on buffability of nickel deposits. *(Photo courtesy The Harshaw Chemical Co., Cleveland 6, Ohio)*

stampings where no polishing is done.

In the plating of complicated shapes of zinc base die castings, invariably there is some action of the acid nickel solution on the base metal where insufficient copper coverage is obtained, resulting in zinc contamination of the solution. Dropped parts remaining in the tank also contribute to the presence of zinc as a contaminant in nickel solutions. Most zinc base die cast parts contain some aluminum, and contamination by aluminum from this source is possible. The zinc is usually kept at a limited concentration by periodic or continuous electrolytic purification, or by dummying out any co-deposition in the low current density areas of the parts being plated. The aluminum is not removed from the solution in this manner and the concentration may build up to the point where it affects the appearance of the nickel deposit. Lead contamination may result from bi-polarity of lead heating coils or attack by chlorides, and although precipitated as lead sulfate, the deposit can be affected by roughness. Figure 3 shows the buffing evaluation machine used at the Harshaw Chemical Company to determine the effect of impurities on buffability of nickel deposits.

By using hard water (which has not been treated or demineralized) to compensate for dragout or evaporation losses, calcium and magnesium contamination may result. Calcium may also come from lime on buffing compounds that have not been removed in the cleaning cycle. The use of lime for high pH treatment produces a saturated solution of calcium sulfate in the nickel bath, which with temperature variations may crystallize in the solution or on anode bags. Sodium and potassium in nickel solutions usually come from dragin of cleaning solutions or cyanide copper solutions on racks or work with deep recesses or pockets which do not permit proper drainage.

With reference to anions, according to Mr. Benning, phosphate contamination may be dragged in from cleaners or from certain proprietary copper baths by being trapped in faulty rack coatings or deeply recessed parts. A case was cited where phosphate, from a phosphoric acid activating bath used for rework parts, was dragged into the nickel solution from the inside of tubular parts with poor drainage char-



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acteristics. Nitrates are normally not encountered, except possibly from dragin from bright dipped parts or by accidental mistakes in additions. Silicates may enter the nickel tank by drag-over of silicate type cleaners, or in some instances from faulty anodes.

Organic contamination may come from the buffing compounds left on parts and not removed by cleaning. Dust, as a source of contamination, is fairly obvious. It may result in roughness or other irregularities. Organic solvents have been used more and more before the usual electrocleaners and may be carried into the nickel tank on porous rack coatings. Grease from overhead conveyors on automatic or semi-automatic plating tanks has occasionally been a source of organic contamination, as well as grease used for packing gland lubricants on pumps. Anode bags made from unapproved materials and not put through a desizing operation may contaminate a solution by introducing organic substances. Anti-oxidants and accelerators may be leached from certain synthetic tank linings and cause trouble in nickel solutions, and for this reason it is usually suggested that new equipment be leached with a mild acid solution containing some wetting agent. The same type of contamination may be obtained from rubber hoses or other rubber or rubber lined equipment including rack coatings if not properly dried or baked. The heat exchanger for bright nickel solutions, shown in Fig. 4, is constructed of carbon to avoid contamination which might arise from contact of the hot plating solution with metals.

Water used for rinsing and bath replenishment may contain organic matter. In one specific instance mentioned by Benning, algae from the water supply caused a severe case of pitting which recurred after treatment until distilled water was used. Recent developments in demineralizing and water purification equipment have

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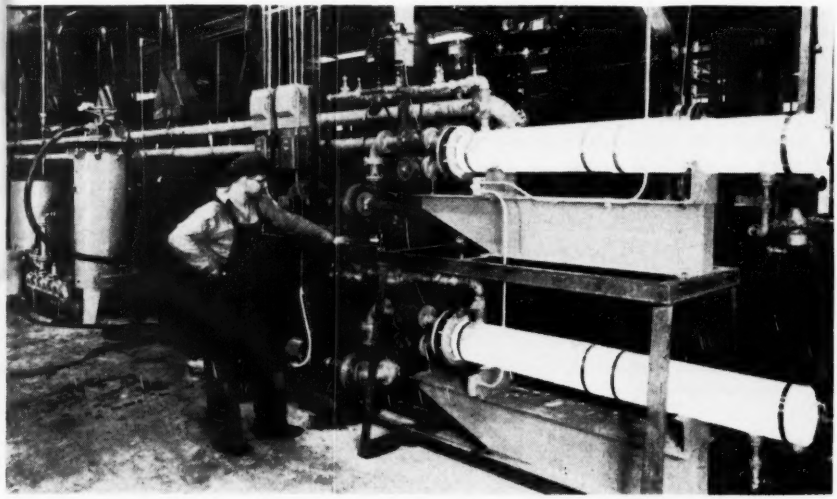
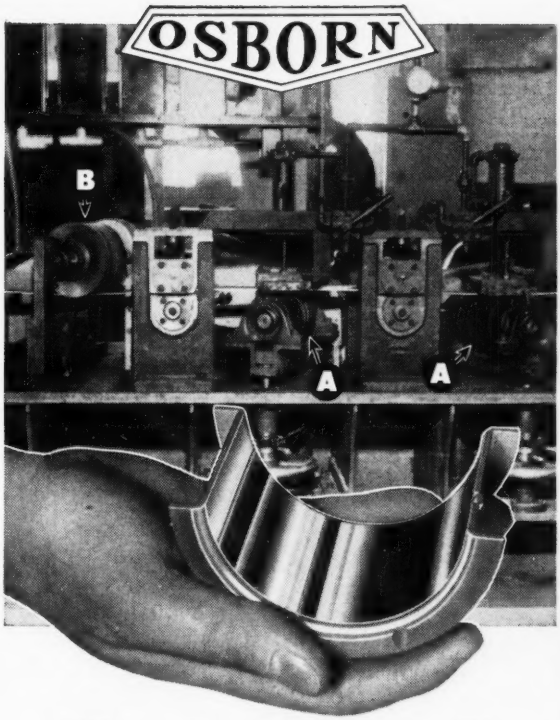


Fig. 4—Impervious graphite shell and tube external heat exchanger in use for heating a large bright nickel solution.
(*Photo courtesy Heil Process Equipment Corp., Cleveland 11, Ohio*)



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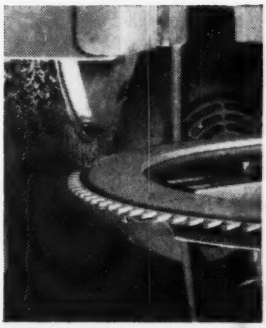
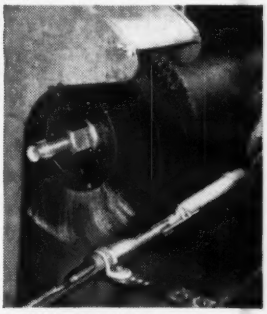


SAVES 12 MEN. This is one station of a five-station rotary automatic machine equipped with Osborn power brushes that removes burrs and sharp corners of clutch disc teeth. Formerly done by hand. Saves 12 skilled men.



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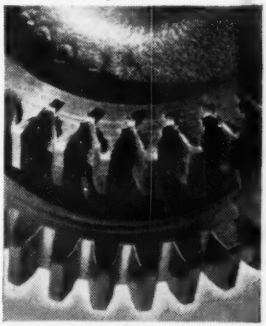

10 TIMES AS FAST. This shows two gears before and after deburring by a new Osborn power brushing method. Note smooth uniform results. Time was cut from 3 minutes to 18 seconds.

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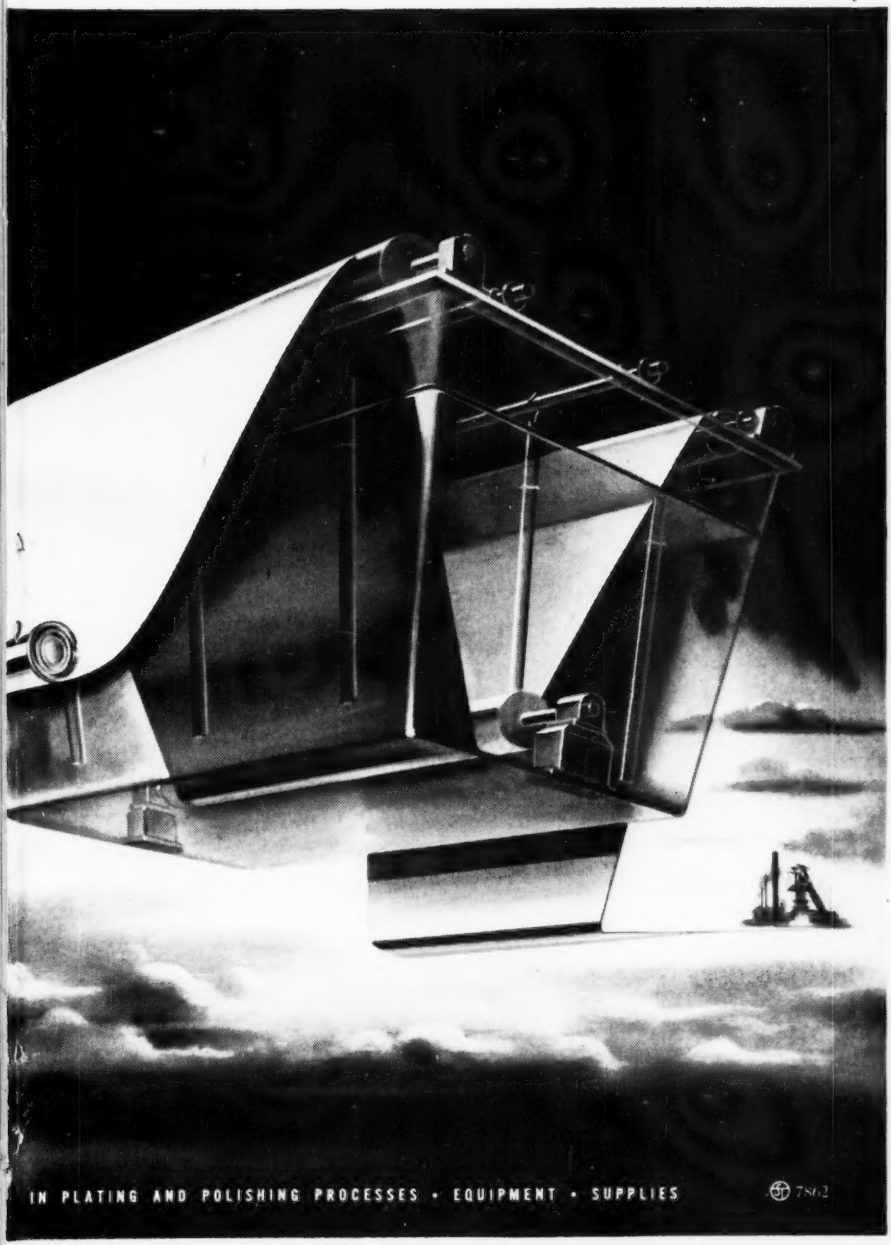
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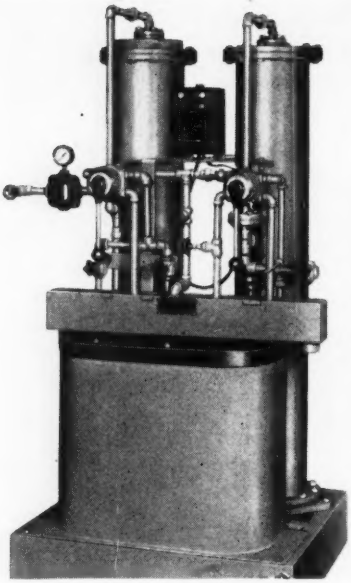

Fig. 5—A Model DL-200 Water Demineralizer with a flow rate of 200 g.p.h. of deionized water. This model includes flow meter, quality indicator, regenerant tanks, valves and interconnecting piping.
(Photo courtesy Industrial Filter & Pump Mfg. Co., Chicago 50, Illinois)

been important factors in eliminating water as a source of contamination (see Fig. 5).

Concentration Limits for Impurities

According to Mr. Benning, maximum allowable limits of iron will depend on the pH of operation of the bath, and whether the iron is in the ferrous or ferric state. Normally, iron enters the bath in the ferrous state, but may be oxidized at the anode surface or by air oxidation. Ferric iron precipitates at a pH of about 3.6 and results in roughness and pitting. For this reason, iron cannot be tolerated as ferric iron in baths above this pH unless very high filtration rates are used continuously. At lower pH values the ferric iron is soluble and, along with the ferrous iron, will co-deposit with the nickel, producing harder deposits with increased stress and poorer corrosion resistance. Figure 6 shows atmospheric exposure racks used to determine the effect of impurities on corrosion resistance of nickel deposits. Dullness may appear in low current density areas at concentrations of as low as 0.1 gm./l. Ferrous iron may start precipitation at a pH as low as 4.5 but is not complete unless the pH is over 5.2.

Copper ions in solution may decrease the bright throwing power at concen-

Fig. 6—Atmospheric exposure racks used at Harshaw Chemical Company to study effect of impurities on corrosion resistance of nickel deposits.
(Photo courtesy The Harshaw Chemical Co., Cleveland 6, Ohio)

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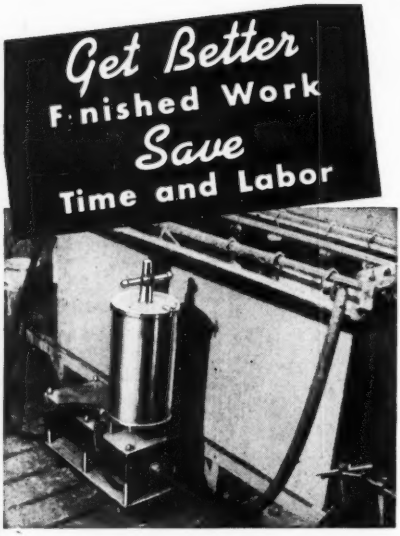

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trations of 0.04 gm./l. and this effect is pronounced at concentrations of 0.1 gm./l. In gray nickel solutions at a pH of 5.5-5.85, roughness has been experienced at high current density points. At concentrations of 0.007 gm./l. deposits were satisfactory; however, at higher concentrations, particularly beyond 0.035 gm./l., deposits were rough and darkened. Mr. Benning postulated that the effects of copper are probably markedly affected by the presence of other impurities. It is generally thought that the effects of zinc contamination are about the same as those of copper. Above tolerance amounts may result in cracking and poor corrosion resistance.

Concentrations of 0.01 gm./l. of chromium in nickel solutions decrease the upper current density limit. Depending on the shape of the part being plated and the current density being used, this may seriously affect the nickel deposit. In some cases, a chromium concentration of 0.04 gm./l. has been tolerated. At higher concentrations the cathode efficiency decreases sharply and may even cease entirely. It has been reported in the literature that 0.01-0.025 gm./l. of chromium contamination caused an increase in stress with some peeling. Chromic acid introduced into bright nickel solutions will oxidize addition agents and these products will affect the deposit depending on the extent of oxidation that has occurred.

Concentrations of aluminum exceeding 0.06 gm./l. in low pH bright nickel solutions have produced powdery deposits on high current density areas resulting in a hazy nickel surface. This occurs at a bath pH over 3.3 when the cathode film pH is above the pH of precipitation of aluminum hydrate. In the high pH baths the aluminum precipitates, and unless filtered out, may result in roughness.

Silicates in nickel solutions may lead to a rough deposit with a tendency to-

to page 72→

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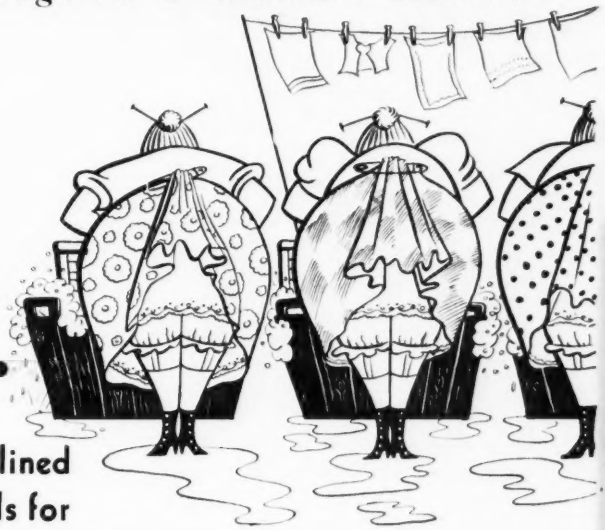

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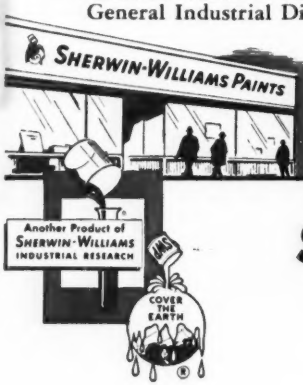

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ward pitting due to precipitation of hydrated oxides. The presence of a silicate film on work from cleaning operations, with inadequate rinses following, may precipitate silicic acids in the acid dip tanks, and the presence of this on the work entering the nickel tank may produce pits.

Organic material may cause any one or any combination of the effects mentioned. Slight contamination by organic impurities may show up in cloudy deposits of low ductility on medium or high current density areas. Still lower concentrations may not cause a visual change in the nickel deposits, but even traces can be detected by changes in ductility of the nickel deposit.

Removal of Metallic Impurities

Benning pointed out that experience has shown that treatment with nickel carbonate to raise the pH of the nickel solution to a value of 6.0 will precipitate the hydrates of iron, copper, zinc, chromium, and aluminum. They may then be removed by filtration. The difficulty of raising the pH of buffered nickel solutions to this value was emphasized; experience has shown that a pH of 5.0-5.5 is about all that can be obtained under normal conditions. In this case iron and aluminum are removed completely with possibly small amounts of copper, chromium, and zinc. Some operators have used lime to raise the pH to a value of about 5.5 or more and followed this with smaller amounts of nickel carbonate to reduce the concentration of calcium by the precipitation of insoluble calcium carbonate. However, difficulties have resulted from incomplete removal of calcium and the loss of nickel by precipitation of hydrates. Copper, zinc and lead may be more easily removed by electrolytic purification which involves the plating out of these impurities at low current

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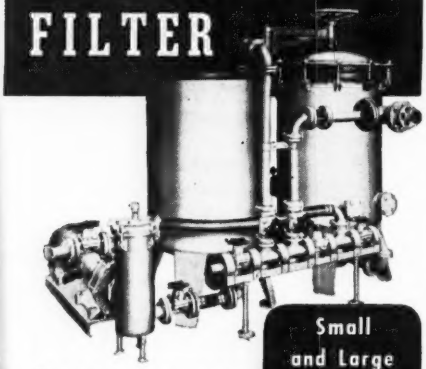

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densities on dummy cathode sheets. B. C. Case has reported that copper and lead are removed most effectively at 2-4 amp./sq. ft., and iron and zinc at 6 or 7 amp./sq. foot.

Although not complete in its removal, a high pH treatment with nickel carbonate will serve to reduce the concentration of trivalent chromium. Chromium has been removed by reduction to the trivalent state with ferrous sulfate, followed by treatment with nickel carbonate at high temperatures. This method is effective if a pH of 6.0 is reached, but is considered to be rather difficult. Chromium may be completely removed to less than 1 p.p.m. by oxidation to the chromate with potassium permanganate followed by precipitation as lead chromate with basic lead carbonate. The pH of the solution is then raised with nickel carbonate and the solution filtered. If organic addition agents are present, this treatment should be followed by a treatment with activated carbon to remove oxidation products. It has been reported that chromium may be removed by electrolysis at pH of 2 and very high current densities.

Calcium concentration may be reduced by raising the temperature of the solution to 160-170 deg. F. and raising the pH with nickel carbonate, followed by a thorough filtration. A more effective method of removal discussed by Benning is by precipitation as calcium fluoride. This method also serves to remove magnesium. With the temperature at 140-150 deg. F. and a pH of 3.2, ammonium bifluoride is added to the solution, slowly, with agitation, using a 100 per cent excess. The pH of the solution is then raised above 5.0 with nickel carbonate. The solution is then filtered after standing with the heat off.

Phosphates have been removed successfully from bright nickel solutions by the addition of ferric sulfate or chloride and raising the pH to 5.0 with nickel carbonate to precipitate basic

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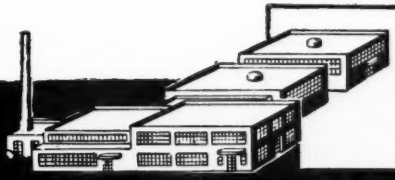

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iron phosphates. Nitrates have reportedly been removed from nickel solutions by electrolytic reduction at the cathode. Silicates are removed by a high pH treatment followed by a high pH treatment with nickel carbonate; however, if large amounts are present, filtration may be difficult.

Removal of Organic Impurities

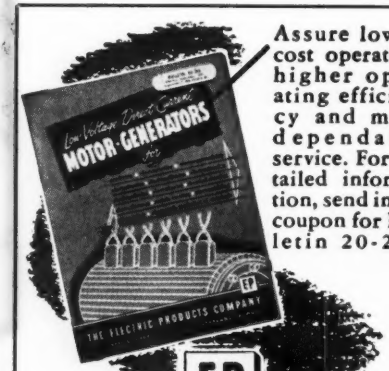
Most organic impurities may be removed by treatment with activated carbon, in the range of about 2 to 6 lb./100 gal. of plating solution. However, there are some organic impurities which are not removed in the form in which they exist in a plating solution. They must be oxidized or reduced to be effectively removed. In doing so, some of the organics that are adsorbable may be changed to a form which is not removed effectively by activated carbon. For this reason it is advisable to carbon treat the solution with activated carbon before oxidation or reduction, and to follow the oxidation or reduction by another carbon treatment for a complete purification. In some cases a circulation through a filter packed with carbon is sufficient before oxidation or reduction, or the solution may be continuously circulated through carbon while treatment by electrolysis is taking place.[1] The choice of oxidation or reduction of organic impurities, to more effectively remove them, is usually based on preliminary laboratory tests by the use of a Hull Cell or bent cathode test. The effects of treatment with potassium permanganate, hydrogen peroxide, or electrolytic dummying before carbon treatment may be determined by beaker tests.

Electrolytic Purification

This method is most effective when used continuously by means of an auxiliary tank through which the plating solution is circulated. For normal rates of contamination the use of 0.05 amperes per gallon of plating solution was recommended by Benning. Since copper and lead are most effectively removed at 3-5 amp./sq. ft., and zinc and iron at 5 or 6 amp./sq. ft. an average current density of 5 amp./sq. ft. on a corrugated steel cathode surface will provide proper current density ranges to effectively remove these common contaminants. On this basis 0.01 square feet of cathode surface per gallon of solution will be required to obtain this current density. The anode to cathode distance should not exceed 3 inches and the solution should be passed through the electrolytic purification tank at a rate sufficient to pass ½ to ⅓ of the volume of solution during each hour of operation.

On the basis of these figures, the purification tank should be designed

[1] See also "Filter Out Your Plating Rejects," Ezra A. Blount, PRODUCTS FINISHING, Dec. 1950.



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How to Determine Impurities in Electroplating Solutions

Of all methods for determining minute impurities in plating baths, the most practical is the *colorimetric*. The principle utilized is simple: color intensity, due to presence of a colored constituent, is directly proportional to the concentration of that constituent.

USE OF THE COLORIMETRIC METHOD

This method requires the measuring of light transmitted by solutions.

Intensity of the transmitted light is measured by photoelectric means to attain a high degree of accuracy. No two solutions of different character will have transmittancy curves of exactly the same shape, hence, a solution under test is usually compared to a reference solution free of impurities. Calibration curves plotted from a series of runs facilitate determinations. Summaries of techniques used to determine four different impurities follow:

LEAD IN NICKEL PLATING BATHS

Lead is separated from interfering ions by extraction with a carbon tetrachloride solution of dithizone in the presence of potassium cyanide. After removal of the excess dithizone with alkaline potassium cyanide, the transmittancy of the solution is measured and the quantity of lead present determined from a calibration curve.

IRON IN NICKEL PLATING BATHS

Iron is separated from the other metallic ions by precipitation with cupferron. The iron cupferride is extracted with amyl acetate and then returned to the aqueous solution by shaking the amyl acetate extract with nitric acid. The iron is then reduced with hydroxylamine hydrochloride. O-phenanthroline is added, and the pH is adjusted with sodium acetate. Finally, the light transmission of the ferrous o-phenanthroline complex is measured.

MANGANESE IN NICKEL PLATING BATHS

The manganese is oxidized to permanganate by sodium periodate in an acid mixture of phosphoric and perchloric acids. The transmission of the solution is then measured.

COPPER IN NICKEL PLATING BATHS

Copper is isolated from the other constituents in the plating bath by precipitation with 2-mercaptobenzothiazole and extraction of the precipitate with amyl acetate. The color is then developed by addition of dibutyl amine and carbon disulfide. After the solution has been diluted with ethyl alcohol, its transmittancy is measured.

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so as to provide a minimum flow rate of 6 ft. per minute past the cathodes. This means that the tank will be long and narrow. Usually it will be necessary to provide additional means of agitation in order to obtain such flow rates with a logical tank design. The effect of a high rate of agitation on the removal of metallic impurities is to increase the rate as much as ten times over that for a tank with low rates of agitation. This is necessary to decrease the cathode solution film thickness and replace the purified solution layer with the contaminated solution. The use of corrugated cathodes also serves to promote agitation by the formation of turbulence to disrupt the tendency toward streamlined flow. The pH of the solution has been shown to have little effect on the removal of impurities by electrolytic methods except in the case of iron which obviously will not be removed if in the oxidized state, and if the solution pH is above the precipitation point of ferric hydrate.

The design of the purification unit is dependent on the individual arrangement and design of the plating equipment with which it will be used. The solution being returned to the plating tank should be filtered through a filter of adequate capacity to give the necessary flow rates.

* * *

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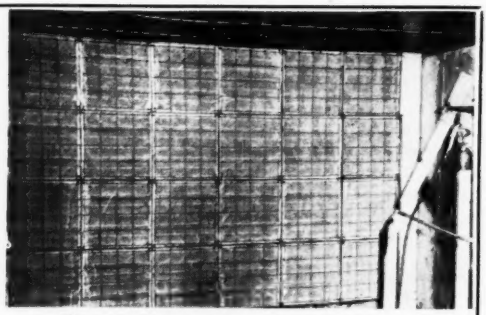

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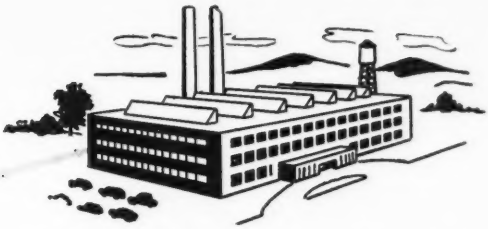

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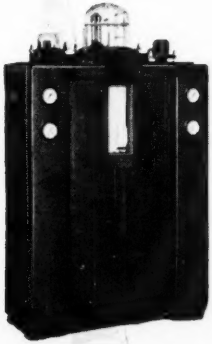

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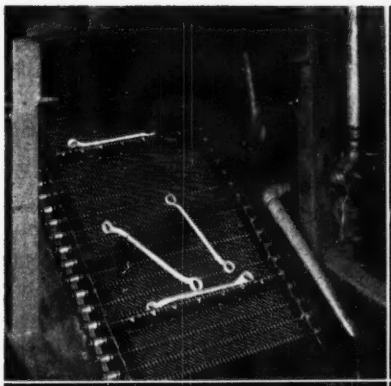
FLEXIBLE SHAFT EQUIPMENT

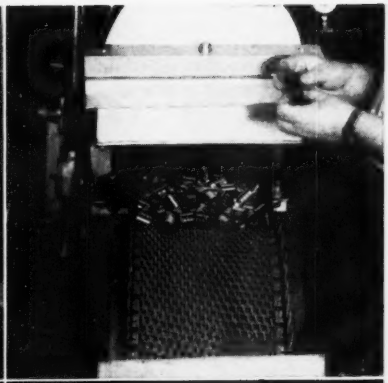
surfaces which usually permits the entry of moisture that may then be held by capillary action for extended periods of time, thus presenting a condition for accelerated corrosion. It is important to protect the faying surfaces as adequately as the general surface protection required when magnesium alloys are in contact with each other for this reason.

According to the Dow Chemical Company, the standard paint systems used with magnesium generally afford sufficient protection for magnesium-to-magnesium contacting surfaces. A minimum of two coats of zinc chromate pigmented primer is required on each surface where it is not desirable to apply the finish paint coatings prior to assembly. If rivets are used in assembly, they should be 56S aluminum alloy. All steel bolts and washers in contact with magnesium should be cadmium or zinc plated. Cement bonded joints offer ideal protection in that the joint is sealed and thus protected with the organic binder.

Magnesium, being anodic to all other structural metals, is sacrificially corroded when in electrical contact with these metals in the presence of an electrolyte. Dow Chemical Company reports that the most common metals that are used in contact with magnesium are aluminum, brass, copper, and steel. As mentioned above, it is possible to suppress this galvanic action by plating the steel, brass, and copper with zinc or cadmium. However, this is impractical on large parts which are used in a structure and is thus limited in application.

The problem of finding better and more simple methods of protecting magnesium in bi-metallic assemblies is a subject of current investigation in the Dow Chemical Laboratories. This has been prompted by recent service failures of magnesium in highly corrosive environments of airframe structures in sea spray, and truck bodies





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movement with processing
REDUCE
rejects and handling costs

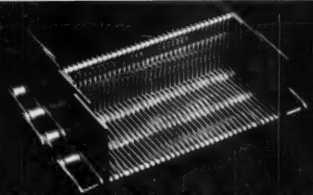

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Table I

PANEL	PRIMER	NO. OF COATS ON EACH SURFACE	HOURS TO INITIAL FAILURE (AV. OF TWO)
1 and 2	AN-P-656a	1	42
3 and 4	AN-P-656a	3	89
23 and 24	Unichrome AP-10	3	161
33 and 34	Ucilon 405 p	3	349
35 and 36	Stanley Chem. Co.	3	OK at 354
37 and 38	AN-P-656a	3 plus 1 unthinned paste. Riveted wet.	OK at 354
39 and 40	AN-P-656a	3 plus 1 unthinned paste. Riveted dry.	90
45 and 46	Americoat No. 33 Dark Blue	3	OK at 354

in chloride-containing road splash. Table I lists the results of one series of tests as recently described by H. K. DeLong of Dow before the Aircraft Industries Association, Aircraft Research and Testing Committee. These tests were conducted using magnesium FS1 alloy-24ST aluminum simulated butt-joint riveted assemblies. These were assembled so that magnesium could be considered the aircraft skin surface and the 24ST aluminum simulating a stringer, thus leaving a seam between the magnesium sheet edges. The assemblies were then exposed in 20 per cent salt spray at 95 deg. F. in a position 10 deg. from vertical with the seam facing upward.

In his paper describing the Dow tests, DeLong pointed out that the results are comparative results with the various primers tested to date on aluminum-magnesium couples and the relative protection is expressed in hours to initial breakdown, or corrosion failure. Tests are also being conducted to compare the use of primers plus finish coats, primers plus tapes, and primers plus sealing compounds. Considering the present status of the Dow test program, a number of general conclusions were discussed.

Indications are that chromates and dichromates are only fair in reducing the corrosion rate of the bi-metallic couples. The solubility of the chromate used and the type of chromate are factors to consider. Magnesium chromate and calcium chromate were found to be more effective than zinc yellow. According to DeLong, at best the chromates reduce the corrosion rate by about 55 per cent on untreated FS1 alloy-mild steel couples immersed in 3 per cent chloride solution. Also, chemical and anodic treatments offer very little improvement to galvanic corrosion in salt spray. Tests showed no difference between the chromate type coatings and anodic coatings of the magnesium hydroxide type.

Tests on primers showed that the AN-P-656 and AN-P-656a zinc chromate primers were much inferior to less porous type primers such as the vinyl type for bi-metallic protection. Three coats of the P-656 type primer were found to be only slightly better than one coat and only a slight advantage was gained by priming the cathode (dissimilar metal). Finish coats, or primer plus finish coats were found to be much more effective than multiple coat priming with the P-656 primers. It is important that the cathode be coated with an impervious type primer, painted, or plated with zinc or cadmium.

—PARCO COMPOUND

Parco Compound, constantly improved over the past third of a century, now offers greatest efficiency and economy in the protection of iron and steel against rust and corrosion.

In addition to rust resistance, Parco Compound adds greatly to the attractive appearance of the treated parts. When it is combined with stains or oils, a very dark satin finish is produced. Treated metal may be waxed, or may be painted with excellent results.

While efficiency and flexibility has increased, cost is still extremely low. Treatment with Parco Compound is quick, simple, uniform, completely dependable. The only limitation on size of parts treated is the size of the processing tanks.

Parco Compound meets government specifications for military use, and is replacing cadmium and zinc in many civilian applications.

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BONDERITE—corrosion resistant paint base • **BONDERITE and BONDERLUBE**—aids in cold forming of metals • **PARCO COMPOUND**—rust resistant • **PARCO LUBRITE**—wear resistant for friction surfaces

The tests indicated that the moisture imperviousness of a paint film is more important than the inhibitive properties of chromate pigmentation for this type of protection. Primers with combined high moisture resistance and chromate pigmentation offer the best overall protection based on tests to date. Specifically, it was pointed out that vinyl chloride-acetate copolymer resin base primers, such as Unichrome 405 P (which is somewhat similar to Bureau of Ships formula No. 120 vinyl primer) and vinyl chloride-acetate vinyl lacquers (such as Unichrome A-147) have shown the most promise in the air dry type finishes tested.

Indications are that Bureau of Ships 52 P 18 zinc chromate primer, an oil modified phenolic material, is more effective than AN-P-656 formulations. Also, a Naval Research Laboratory experimental magnesium primer Code No. N.R.L. Ca-15-01, which is of the above general type, but apparently containing calcium chromate and zinc chromate as the pigment, is showing excellent protection in tests now in progress, and is almost equal to the vinyl type chromate primers. However, oil modified phenolics are relatively slow drying. No couple corrosion tests have been conducted on baking primers and enamels.

It was pointed out that when AN-P-656 paste is used as the sealing compound, it is important to assemble the joint while it is still wet. Applying the primer paste and allowing it to dry before assembly does not seal the joint and provide the equivalent protection of assembling with wet paste.

Concerning another type of protection, DeLong pointed out that electroplated magnesium using decorative copper-nickel-chromium plating is unaffected in contacting areas with either steel or aluminum. Plating will normally protect magnesium up to 200 hours in salt spray depending on the plate thickness. However, it should be realized that plating of magnesium would be limited to smaller parts consistent with type and size regularly plated in other metals.

Porcelain enamel of a special high temperature and corrosion-resistant type is now being used on jet engine combustion chambers, exhaust tail cones, deflector vanes, and other parts.

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NEWS of the Industry

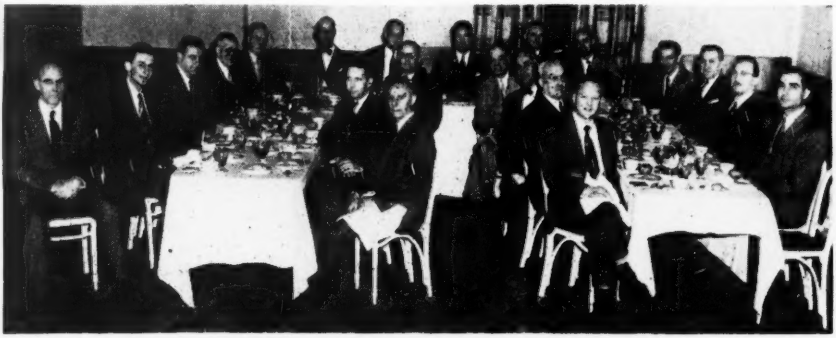
COMPANIES

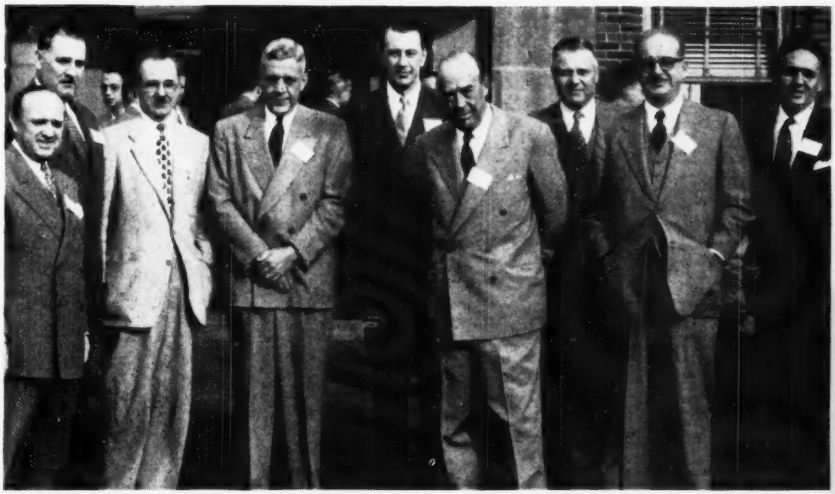
The Annual Eastern Division Sales Conference of **MAAS & WALDSTEIN COMPANY,** manufacturer of industrial finishes, Newark, Chicago, and Los Angeles, was held on January 25, 1952, at the Essex House Hotel, Newark, New Jersey.

The company's guest speakers included James A. Bede, president of Bede Products Inc., Cleveland, Ohio, who spoke on the subject of the Hot Spray Process, and R. L. Faber, district representative of the Edwin L. Wiegand Company, manufacturer of radiant heaters for the drying of synthetic enamels.

B. F. Ames, general sales manager of Maas & Waldstein, discussed the company's expanded advertising and sales promotion plans for 1952 and one of the highlights of the meeting was a resume of the progress made with one of the company's newest products, known as Plextone, the multi-colored enamel that is being used on industrial products and for architectural use.

View of the members who attended the Maas & Waldstein Annual Eastern Division Sales Conference. Seated around the table from left to right are W. J. Gamblin, supervisor, Lacquer Section of the laboratory; R. S. Blake, northern Connecticut-western Massachusetts; R. S. Benjamin, Philadelphia; T. B. Haddow, New York; F. M. Erlenmeyer, Connecticut; E. R. VanDerHoef, New Jersey; C. L. Berry, manager, Midwest Division; B. F. Ames; James A. Bede, president, Bede Products Inc.; Joseph Sanches, Eastern representative, Bede Products Inc.; J. M. Coyne, Sales Department; C. F. Rohleder, chief chemist; J. L. Ledeen, sales manager, Plextone Division; D. Roberts, New York. Men on the inside of the "U" formation, seated left to right, are B. Warren, Essex Chemical Division; J. S. Congleton, supervisor, Synthetic Section of the laboratory; S. Robinson, New Jersey (seated in front of C. L. Berry); W. C. Treadwell, Rochester (seated in front of B. F. Ames and James A. Bede); D. P. Volino, Philadelphia; A. W. Keller, New York; H. J. Adams, eastern Massachusetts.





Executives of American-Marietta Company in front of the research laboratory of The Arco Company, Cleveland, at the beginning of a company-wide meeting of technical personnel held at Arco. Left to right are: D. E. Eichelberger, Sewall Paint and Varnish Co., Dallas, Tex.; R. L. Oughton, executive vice president, American-Marietta Co., Chicago, Ill.; Dr. E. W. Scripture, Jr., vice president in charge of research, Master Builders Co., Cleveland, Ohio; E. Spoerry, Jr., executive vice president, The Arco Co., Cleveland, Ohio; R. L. Pflaumer, vice president, American-Marietta Co., Chicago, Ill.; Kenneth Clarke, president, The Arco Co., Cleveland, Ohio; W. C. Jeppson, Charles R. Long Co., Louisville, Ky.; R. L. Hemingway, president, American-Marietta Co., Chicago, Ill.; Dr. D. M. Gans, director of research, The Arco Co., Cleveland, Ohio.

TRUE BRITE CHEMICAL PRODUCTS CO., Oakville, Conn., is now being operated by Henry Strow, who was the chief chemist of MacDermid, Inc., Waterbury, Conn., and continues as its consultant.

The True Brite plant was recently enlarged, and new equipment was installed for the compounding of copper and brass plating solution materials. The company will continue with present distributors and products and with the development of new products for the plating trade.

"Watch inventories of raw materials; keep careful check on them," H. J. Hemingway, president of American-Marietta Company, told technical personnel of the A-M divisions and subsidiaries who met for three days at **THE ARCO COMPANY,** Cleveland, Ohio, early in December. He spoke at the close of a series of general and group meetings in the Arco lab and office buildings in which new scientific developments were discussed, and information on lab and production problems was exchanged. Special attention was paid to government specification formulation and industrial enamels.

The meeting, one of a yearly series conducted by American-Marietta and held at the plant of a different affiliate each year, enables each subsidiary or division to keep informed of the advances made by other A-M units during the year.

The meeting was held under the direction of R. E. Pflaumer, technical vice president of A-M. More than 65 persons were in attendance.

Installation of continuous process machinery in its Ceramic Color Division has more than tripled production, according to **FERRO CORPORATION** of Cleveland. In addition, new equipment such as the spectrophotometer has contributed greatly by providing rigid quality controls and improved production efficiency.

The spectrophotometer automatically records a continuous curve showing reflections of color for each wave length

of the spectrum, thus giving Ferro's Color Division an infallible check for matching colors in all types of ceramic products.

AMERICAN CHEMICAL PAINT CO., Ambler, Pa., has recently undertaken a research program under contract with the Office of the Quartermaster General, Washington, D. C. The scope of the program, under Harry Faigen, will be the investigation and development of prepaint treatments and final chemical treatments of metal surfaces for the protective finishing of designated Quartermaster articles of supply.

The appointment of Industrial Systems Co., New Brunswick, N. J., as exclusive distributors for its complete line of washing and metal treating machines has been announced by **INDUSTRIAL WASHING MACHINE CORP.,** New Brunswick, N. J. The move, which consolidates the manufacturer's sales activities, makes Industrial Systems Company sole sales agents on both the national and international levels. The sales company also acts as exclusive distributors of Industrial Systems Conveyors.

BEHR-MANNING DIVISION of Norton Company has evolved a way of showing off its own coated abrasives and sanding belts by exhibiting the latest developments in the abrasive machinery field. For this purpose, B-M is taking around the country a Grinding and Polishing Show. The first big clinic was held in Boston, the next one will be in Chicago. From there the show will move from city to city, coast to coast.

Behr-Manning has been doing this type of clinic work on a smaller scale since the war. It set up 15 demonstration rooms attached to its branch warehouses and sales offices in various cities, plus headquarters in Troy, New York. Each demonstration room is equipped with the latest machinery of the kind that is used in that particular area.

THE SUFFERN PLATING CORPORATION has moved its office and plant to modern and larger quarters at 199 Goffle Rd., Hawthorne, N. J. The capacity of this plant is substantially greater than that of the previous plant in Suffern, New York.

SELAS CORPORATION OF AMERICA, heat processing engineers, Philadelphia, has announced the opening of a Pittsburgh office at 3829 Willow Avenue under the direction of John L. Wilson who has represented Selas in the Pittsburgh area for three years.

The award of 75 post-graduate fellowships to 47 universities, and grants-in-aid to 15 universities to "stock-pile" knowledge through the support of fundamental research was announced recently by the **DU PONT COMPANY.** They are for the 1952-53 academic year.

These grants are for unrestricted use in the field of fundamental chemical research. The Du Pont awards in recent years have been so successful in furthering this work that the company decided to raise the yearly contribution from $10,000 to $15,000 to each of the ten uni-

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versities which received awards for the present academic year and to make new grants of $10,000 each to five others. The grants are guaranteed for two years.

THE PENNSYLVANIA SALT MANUFACTURING COMPANY announces the consolidation of all sales and service in chemical specialties for metal cleaning, fabricating, and processing in one sales department named the Metal Processing Department. Headed by J. J. Duffy, Jr., sales manager, it represents a merger of two groups which have heretofore functioned independently of one another within the company; namely, the Industrial Metal Cleaners Department and the Fos Products Department.

Opening of a regional sales office and warehouse building at 732 Ashby St., N.W., Atlanta, Ga., was announced recently by officials of the **MINNESOTA MINING & MANUFACTURING COMPANY.**

George E. Steck has been Southeastern cellophane tape sales manager for 3M since 1948, when the company opened a sales office in Atlanta. Russell D. Baird, fromerly office manager of the firm's branch at High Point, North Carolina, has been named to a similar post in Atlanta.

NEW POSITIONS

WILLIAM E. KNAPPMAN, a veteran of 24 years in the field of paint research, has been appointed technical director of the United Lacquer Manufacturing Corporation, it was announced recently. In this capacity, he will direct research activities in the company's development laboratory, which currently is being tripled in size. Development of quality finishes and protective coatings for industry and the defense program is the keynote to United Lacquer's research activities.

The new technical director brings with him a vast background and experience in the field of raw materials, formulation and administration. Mr. Knappman will continue to serve the U. S. Army Quartermaster Corps, as he has for the past four years, as a part-time consultant on protective organic finishes.

JOHN H. GORMAN has recently joined the technical staff of the Hanson-Van Winkle - Munning Co., Matawan, N. J., as electrochemist, and has been placed in charge of customers' technical service.

John H. Gorman

After receiving a degree in chemistry from Western Reserve University, Mr. Gorman spent considerable time in post graduate chemistry studies. He has had a wide industrial experience as plating chemist, metallurgist, and consultant in the electroplating field in the Chicago and Ohio areas.

At a meeting of the board of directors of the Pyrene Manufacturing Company,

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SpeedWay SpeedSander
$34.50
MOTOR-DRIVEN
3/16" Orbital-Motion
Sands, Rubs, Polishes ... for Dry or Wet Finishing
Powerful, direct-connected (no gears), 3450 r.p.m., 100-120 v AC air-cooled motor. All sealed ball-bearing construction. Die-cast aluminum housing, polished. All-position handles. In hand weight only 5 lbs. Insulated with ground wire for wet as well as dry sanding or rubbing. Available accessories—deep contour pads, surface plates, felts, etc. Takes any sheet abrasives—3 covers 4½" x 6¼" from standard 9" x 11" sheet.
A time saving quality tool priced so every worker can have one.
Write for Circular
SpeedWay MANUFACTURING CO.
1895 So. 52nd Ave., Cicero 50, Ill.

LUIS E. ECKELMANN was unanimously elected a vice president in general charge of development work and of the Metal Finishing Division.

In April 1916 Mr. Eckelmann, while still a student at the Polytechnic Institute of Brooklyn, New York, joined the company to do part-time research, and following graduation in June of that year became a full time member of the staff.

Mr. Eckelmann has established a national reputation as an expert in electrochemical problems, and under his guidance the Metal Finishing Division has become an important branch.

William R. Tuttle

WILLIAM R. TUTTLE, president of Tuttle & Kift, Inc., Chicago, has been elected to the board of directors of Ferro Corporation to fill the vacancy left by the death of Don C. Wheaton.

Mr. Tuttle, who has been president of the Ferro Corporation subsidiary since 1937, is an electrical engineer and the holder of many patents on electrical equipment.

PHILLIP MILLARD has resigned as materials engineer at the Detroit Arsenal to join the sales engineering staff of Automotive Rubber Co., Inc., Detroit, Mich.

A University of Detroit engineering graduate, Mr. Millard's background includes experience as rubber engineer with both Chrysler Corporation and Briggs Manufacturing Company.

Heil Process Equipment Corporation, manufacturer of chemical-proof equipment such as tanks and tank linings, anodes, and heat exchangers, has recently appointed **FRED W. ARNDT** as direct representative to cover the Eastern States. His headquarters are at 152 W. 42nd St., New York, New York.

Fred W. Arndt

Mr. Arndt has had several years' experience as engineer and sales engineer in the process equipment field. He received his Chemical Engineering degree from Pratt Institute and his M. S. degree from Stevens Institute of Technology. After a training course at the Cleveland plant, he is now in a position to give engineering assistance in connection with the many corrosion resistant products fabricated by Heil Process Equipment Corporation.

RICHARD A. SNYDER and **KENNETH W. MONTFORT** have been appointed district sales managers for Pennsylvania Salt Manufacturing Company of Washington, William J. F. Francis, sales manager of the Special Chemicals Divisions, has announced.

Mr. Snyder assumes the position of district sales manager of the Industrial Cleaners Division and will head the company's Los Angeles sales office, located in the Westland Warehouse Building. Prior to this appointment he was technical sales and service representative in Berkeley. A chemical engineering graduate of the University of Michigan, he joined Pennsalt's Heavy Chemicals Sales Department in Tacoma in 1946.

Mr. Montfort becomes district sales manager of the Agricultural Chemicals Division and wil continue to make his headquarters in Portland, Oregon.

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PAINT REJUVENATOR
All paint restored to original consistency without opening the can.
2 minutes per gallon.
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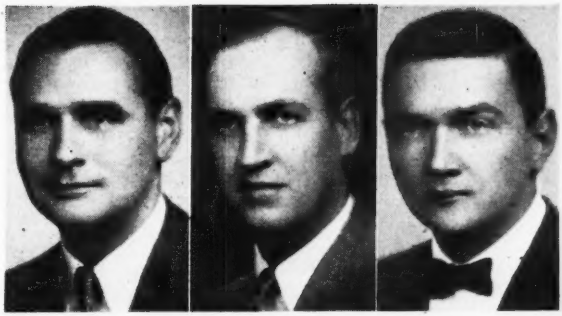

(Left to right) Henry A. Thouron, James W. L. Monkman, Paul L. Johnstone

The appointment of three men to key executive positions in Hercules Powder Company's Synthetics. Department was announced as follows:

HENRY A. THOURON to a newly-created position of assistant general manager; **JAMES W. L. MONKMAN** as director of sales to succeed Mr. Thouron; **PAUL L. JOHNSTONE** as director of development, also a newly-created position in the company.

Mr. Thouron, a graduate of Princeton, joined Hercules in 1934. From 1934 to 1940 he was a technical sales representative for the Naval Stores Department. Following service with the Army, he rejoined Hercules in 1945, becoming a member of the sales division of the Virginia Cellulose Department, and then assistant director of sales of the Synthetics Department in 1946. Before becoming director of sales for Synthetics in 1950, he spent several months as special assistant to the director of N. V. Hercules Powder Company, a subsidiary in Holland.

Mr. Monkman, Synthetics' new director of sales, is a graduate of Harvard with a degree in chemistry. He joined Hercules in 1941 as a chemist at the Experiment Station. In March 1945 he became a member of the Synthetics Division at the Experiment Station, and in 1946 he became a member of Synthetics' new development group.

Mr. Johnstone, director of development, is a graduate of Princeton with a B.S. degree in chemical engineering. He joined Hercules in 1940 as a chemist at the Experiment Station. When he returned to Hercules from service in 1945, he was assigned to new product development work, and in 1950 became manager of Synthetics Market Development Division. In this capacity he supervised product development, market surveys, and sales promotion of new products.

GEORGE J. ZAHRINGER, JR., has joined The Dow Chemical Company at its Midland, Michigan offices to assist in the development and sale of solvents for industrial applications, according to Sales Manager L. P. Butenschoen.

Mr. Zahringer was educated at Northwestern University where he received his degree in chemistry in 1946, and at Harvard where he received his master's degree from the Graduate School of Business Administration. Before coming to Dow he was employed in the sales department of the American Mineral Spirits Company in Chicago.

Leonard Davis, president of the Morrison Engineering Corp., Cleveland, Ohio, manufacturer of continuous heat treat furnaces, annealing furnaces, flash bakers, aluminum hardening ovens, paint ovens, and forging furnaces, has announced the appointment of **T. F. FLEMING** as general manager.

Mr. Fleming will head the metallurgical department of the company. Formerly, he was supervisor of the heat treating department of the National Screw & Manufacturing Company, and technical representative of the World Metallurgical Congress staff.

McKeon's
"Liquid Sulphur"
FOR COPPER STRIPPING NON-DANGEROUSLY
Economical, Non-Electrolytic.
No special equipment required.
Write for descriptive brochure.
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Acid Carryover into rinse baths not only makes rinsing more difficult, but it means much of your valuable acid is going down the drain. This needless waste can be corrected easily and effectively with ACTIVOL # 1321.

ACTIVOL *activates* acids causing them to go to work on oxide scale faster and more efficiently to produce clean, unpitted surfaces. Metals lifted from the bath drain off the acid so completely that carryover is cut to an absolute minimum with acid savings from 10% to 40% possible in most cases.

ACTIVOL is effective on all mineral acids including sulphuric, hydrochloric, muriatic, nitric, hydrofluoric, chromic and phosphoric acids for pickling, anodizing, galvanizing, plating, wire drawing, etc.

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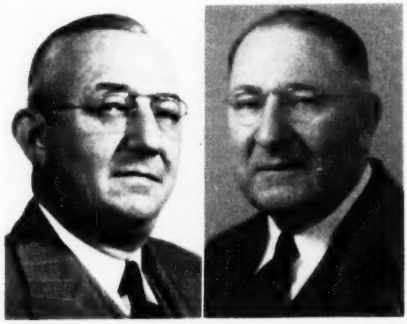
4th & BRISTOL STS. • PHILA. 40, PA.

GEORGE A. FYRBERG became production manager of Norton Company's Abrasive Division February 1, succeeding **HAROLD C. DUNBAR** who retired after 39 years with the company. Mr. Fyrberg, who began his Norton career in 1915 in the Stock department, has been Order Service superintendent since 1944.

Mr. Fyrberg's father retired in 1932 following 40 years in Norton's Abrasive Division. He has a son, George A. Jr., now working in the Grinding Machine Division.



George A. Fyrberg (left), Harold C. Dunbar

MELVIN J. HENRY has been appointed general sales manager of the United Lacquer Manufacturing Corporation, it was announced by Saul Cantor, vice president. In this capacity he will supervise distribution, merchandising, market development, and customer service.

Mr. Henry formerly was connected with R. H. Macy and Company.

Melvin J. Henry

Dr. John F. Thompson, chairman and president of The International Nickel Company of Canada, Limited, has announced that **GORDON R. BALL**, vice president, general manager, and a direc-

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The day you call in a KOCH finishing expert is the day you'll learn how much more profitably you can run your manufacturing operation. A complete KOCH finishing system offers you labor savings up to 50% . . . an improved finish for your product . . . a smooth, efficient conveyorized production that lowers costs and returns a good dividend on the investment. Get the complete facts NOW!

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GEORGE KOCH SONS, INC.
EVANSVILLE, INDIANA

tor of the Bank of Montreal, has been elected a director of International Nickel.

Mr. Ball has been vice president of the Canadian Bankers Association since 1950 and he is chairman of the Canadian Government Advisory Committee on Overseas Investments.

Bernard C. Case

The Hanson-Van Winkle - Munning Company of Matawan, New Jersey, has announced the appointment of **BERNARD C. CASE** as manager of Electrochemical Development. Mr. Case has transferred his activities to the Matawan laboratory from his position as field engineer at Detroit.

Mr. Case brings exceptional qualifications to this new post. Recently honored for his work as vice chairman of the Research Committee of the American Electroplaters' Society, Mr. Case was associate editor of "Plating" and has been active as chairman of the Detroit Section of the Electrochemical Society, Chairman of Sub-Committee 3 of B-8, A.S.T.M., and is an active member of the American Institute of Chemical Engineers.

The appointment of two additional vice presidents and a chief engineer at Edwin L. Wiegand Company, Pittsburgh, has been announced by President Ernest N. Calhoun.

JOSEPH McORLLY, chief engineer since 1940, is now vice president in charge of engineering. **LESTER D. DRUGMAND** has been named his successor as chief engineer.

JOHN W. BAILEY, personnel director since 1944, becomes vice president in charge of industrial relations.

Mr. McOrlly joined the company in 1935 as electrical engineer and prior to that had been engaged as electrical engineer with industrial and power company affiliations. He is a member of the American Institute of Electrical Engineers.

Mr. Bailey, a 1924 graduate of Gettysburg College, has been engaged in personnel work for practically his entire business career. Mr. Drugmand had been an industrial development and research engineer before joining the company in 1948 as assistant chief engineer. He is a 1941 graduate of Carnegie Institute of Technology.

Emil Spoerry, Jr.

EMIL SPOERRY, JR., has been named executive vice president of The Arco Company of Cleveland, a subsidiary of American - Marietta Company. Announcement was made by Kenneth E. Clarke, president of Arco and vice president of American-Marietta.

Mr. Spoerry has been secretary-treasurer and a director of The Arco Company for several years, having joined the Company in 1935. Formerly he was secretary-treasurer and a director of The Arco Company of California, Ltd.

DR. WM. HIRSCHKIND, for many years research director of The Dow Chemical Company's Western Division, has been appointed technical adviser to Dow President Leland I. Doan, the company has announced. Concurrently, the company named **ROBERT G. HEITZ** to replace him as its Western Division research director.

Born and educated in Germany, Dr. Hirschkind came to this country in 1912. He became associated with the Great Western Electro-Chemical Company in 1916 and was made its research director in 1922. After Great Western's merger with Dow in 1939, he continued in the same capacity until his present appointment. He will continue to make his headquarters at the company's plant in Pittsburg, California.

Mr. Heitz has been associated with Dow since his graduation from California Institute of Technology in 1936. Starting his career in Midland, he was transferred to Dow's Western Division in 1939 and has been assistant to Dr. Hirschkind for the past several years.

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HARSHAW SCIENTIFIC DIVISION OF THE HARSHAW CHEMICAL CO. CLEVELAND 6, OHIO
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CLEVELAND F. NIXON has been named to succeed **WILLIAM M. PHILLIPS**, Head of the Electrochemistry Department of the General Motors Research Division, who retired at the end of 1951.

Cleveland F. Nixon

A graduate of the University of Pennsylvania, Mr. Phillips joined General Motors in 1921. He is best known for his efforts to improve the standards of commercial electroplating, and for developing copper and nickel plating baths. He is a past president of the A.E.S., and has served for many years on A.S.T.M. committees. He has twice been the recipent of the A.E.S. Gold Medal and a special Navy Award for Meritorious Service.

Mr. Nixon, a graduate of Wisconsin University, has been at General Motors' Ternstedt Division since 1930 as director of Process Engineering. He is presently president of the A.E.S., and a Gold Medal winner. He is best known for his work in the field of quality control for plating in mass production, as well as process simplification.

ALBERT E. FORSTER has been elected a vice president and member of the executive committee of Hercules Powder Company, the company has announced. **PAUL MAYFIELD** has been appointed general manager of the Naval Stores Department, succeeding Mr. Forster to that position.

The election of Mr. Forster to a vice presidency fills a vacancy created by the retirement of **PETRUS W. MEYERINGH** because of ill health.

Mr. Meyringh's retirement ended an association with Hercules which began nearly 30 years ago in The Hague, Holland. In various executive capacities he has actively participated in many of the company's progressive developments.

Mr. Forster became associated with Hercules Powder Company in 1925. He was employed in the sales, technical service, and production phases of the Explosives Department, and held responsible executive positions in several Hercules plants and sales offices.

Mr. Mayfield joined Hercules Powder Company in 1925 as a chemist at the company's experiment station. He was engaged for a time in sales and technical service work, developing markets for both cellulose and naval stores products made by Hercules.

Appointment of **S. L. JOHNSON** as manager of the New Methods Development division of the "3M" coated abrasives division was announced by Minnesota Mining and Manufacturing Co., St. Paul, Minn. He will direct the division in developing new machinery and techniques for conditioning carbon and alloy steels, and in developing improved methods for grinding and finishing other metals.

S. L. Johnson

Mr. Johnson joined 3M as a methods engineer in the coated abrasives division in 1943, and has served as supervisor, new methods division, since 1946.

Promotion of six key executives of Minnesota Mining & Manufacturing Company has been announced, as follows:

LOUIS F. WEYAND, a vice president and member of the board, was promoted to executive vice president.

ROBERT W. YOUNG, president of Minnesota Mining & Manufacturing International Company, a wholly-owned 3M subsidiary handling foreign trade, was named to the chairmanship of that organization's board.

CLARENCE B. SAMPAIR, vice president of 3M International, succeeded Mr. Young as president. Mr. Sampair also retained his post as a vice president of the parent company.

Vice president **JOHN A. BORDEN,** general manager of the cellophane tape division, was named sales and marketing consultant for all 3M tapes.

The board also elected **GEORGE W. SWENSON** and **HUBERT J. TIERNEY** vice presidents of the parent company.

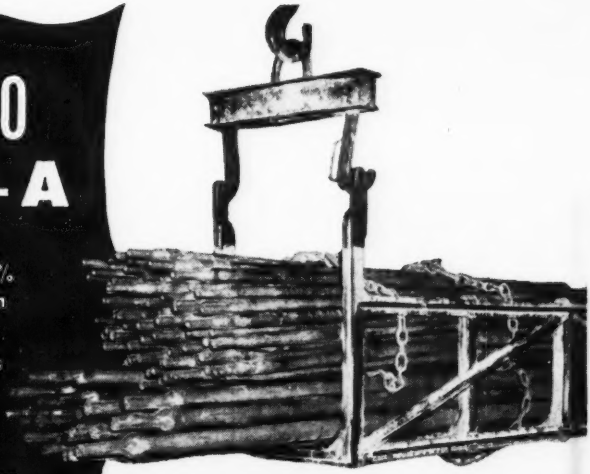
NOPCO 1067-A

★ saves over 30% sulfuric acid solution in pickling of iron, steel and nonferrous metal products

★ aids processing

★ speeds production

★ assures improved output



Add Nopco 1067-A to the pickling bath, and you reduce loss of sulfuric acid solution through carryover to the rinsing tank by 30% to 40%.

Here's a definite economy, of outstanding benefit today when current restrictions limit the use of sulfuric acid.

But Nopco 1067-A not only effects high drainage, it also affords such important advantages as these:

- ★ ***faster, deeper, and more uniform penetration of oxide scale—resulting in elimination of pitting, lower metal losses, and smooth, clean surfaces after pickling***
- ★ ***reduced operating time and lower costs—since better drain-off means fewer rinsings for complete acid removal***
- ★ ***reduced acid contamination in operations following pickling—with the result that tool and die life is increased***
- ★ ***easier acid disposal—since acid is localized in first tanks***

In a word, addition of this unique surface tension depressant to your sulfuric acid pickling solutions not only means *money in your pocket,* but more satisfactory products coming off your production line.

LET US TELL YOU ALL ABOUT NOPCO 1067-A. MAIL THE ATTACHED COUPON TODAY.

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KEEP SPRAY BOOTHS SAFER FROM FIRE!

WITH NON-INFLAMMABLE

BOOTHCOTE #4

FOR DRY WALL BOOTHS AND THE NEW

BOOTHCOTE #5

FOR WATER WASH BOOTHS

Makes frequent cleaning easy. Pre-mixed, ready to use, safe to store. Saves time, labor, no flaking off. Spray or brush on clean booth. When desired, operator peels off overspray in sheets. Advocated by insurance companies.

Money-back trial offer: 5 gals. $6.25

HYGRADE'S STERLING CREME

protects hands and arms from paint, grease, ink, etc. penetrating skin. Soil washes off easily without harsh solvents or cleaners.

40 lb. pail $12.

HYGRADE'S STERLING CLEANER

(WATERLESS HAND CLEANER)

dissolves grease, grime, fresh paint, tar, printers' ink, shellac, mastic cement, etc. without water. 40 lb. pail **$9.00.** ***All prices f.o.b. Buffalo.***

HYGRADE

FOOD PRODUCTS CORP.

Industrial Div., 18 Stetson St., Buffalo 6, N. Y.

ROY C. SHEELER, assistant to the manager of trade sales of the Du Pont Company's Finishes Division, retired January 31 after more than 29 years with the company and 43 years in the paint business.

Mr. Sheeler joined the Du Pont Company in October 1922 to edit "Principles and Practices of Upkeep Painting," a publication devoted to maintenance painting. This manual, which went through six editions, was adopted as a standard book of reference and practice by thousands of industrial plants, institutions, and the like in all parts of the world.

Mr. Sheeler later handled engineering and technical problems in connection with trade sales of the Finishes Division, and then became assistant sales manager of maintenance and upkeep sales.

MEETINGS

The **AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC.,** will hold its 1952 Annual Meeting at the Drake Hotel, Chicago, Illinois, on March 24 and 25, 1952.

It is expected that the majority of the sixty member companies will be represented at this important meeting according to Stuart J. Swensson, secretary-treasurer of the Association. The importance of the times with regard to the zinc situation and the variety of subjects to be discussed at the meeting are resulting in high membership interest.

Two hot-dip galvanizing plants will be visited by the membership on March 25. The Joslyn Manufacturing & Supply Company and the Equipment Steel Products Company have both invited the Association to tour their plants.

The **AMERICAN ZINC INSTITUTE** has announced that its 34th Annual Meeting will be held at the Hotel Statler, St. Louis, Missouri, on Monday and Tuesday, April 21 and 22. Present plans provide for a full two-day program with a morning and afternoon session scheduled for both Monday and Tuesday.

Qualified speakers from Washington and from the industry will report on the general outlook for metals and the zinc supply and requirements picture. Mine development and production expansion at home and abroad will be thoroughly

Start Clean... *Stay* Clean!

Sally spent too much time pushing that mop around to risk having dirty paws track up her floor . . . and no plater can afford to risk clean metal in a bath of questionable purity.

Red Label Darco S-51 adsorbs impurities that cause trouble in plating baths . . . takes them out before they can be deposited on the freshly cleaned surface of your work. It helps you save on scarce metals and do a better job with thinner deposits.

With clean metal . . . keep the bath clean

Red Label Darco S-51 is specially treated for use in plating — the only carbon that meets the benzol-mercury test! It's easy to handle . . . easy to wet . . . easy to make into a slurry. Place your order for Red Label Darco S-51 today. Nearly all suppliers carry Darco in stock, so don't accept substitutes.

Send for reprints of "Filter out your plating rejects."

DARCO DEPARTMENT

ATLAS POWDER COMPANY

Darco General Sales Offices

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covered by a special panel of mining men. Plans are under way to add several special features to the program relating to topics of vital interest to all concerned.

The annual dinner and smoker will be held on Monday evening, April 21.

SOCIETIES

Chicago, largest city in the Midwest, will be host to the **A.E.S. 39th ANNUAL CONVENTION** which will be held concurrently with the **THIRD INDUSTRIAL FINISHING EXPOSITION** June 16-20, 1952.

The largest hotel in the world, the Conrad Hilton, will serve as Convention headquarters. Educational sessions will take place at the Stock Yard Inn and the International Amphitheatre will be the site of the Industrial Finishing Exposition.

A nationally-known speaker will open the program on Monday, June 16, at 9:00 A.M. Educational sessions will follow, being scheduled for 9:00 A.M. in the mornings and 2:00 P.M. in the afternoons. To date, only one afternoon session has been planned, it being a dual session on Monday afternoon. This is an experiment in which two speakers will give papers at two different locations.

Among the speakers who will present papers this year are Dr. Harold Weisner, W. S. Morrison and L. Gilbert, Harold Faint, D. Patrick, and others well-known to the industry.

Two symposiums, Materials of Construction and Instrumentation, and Auxiliary Equipment, are scheduled. Panel members for these symposiums include Fred Brune, Chrysler Corporation; Dr. Russell Harr, Western Electric Company; W. H. Prine, International Nickel Company; Frank Savage, and Dr. A. K. Graham.

Hours for Exposition attendance have also been announced and are as follows:

Mon., June 16—12 Noon to 10 P.M.
Tues., June 17— 9 A.M. to 5 P.M.
Wed., June 18—12 Noon to 10 P.M.
Thurs., June 19— 9 A.M. to 5 P.M.
Fri., June 20—Exhibitors "get-away day."

A program of unusual interest with new features has been prepared for the ladies by Mrs. Marion Longfield, Ladies' Chairman, and her committee. During the opening session, which the ladies are to attend with the men, one of their number will be chosen as Queen and two ladies as the Queen's attendants. The Queen will serve as First Lady of the Convention at all functions in which the ladies participate. She will be crowned and honored at the International Fellowship Club party in the Grand Ballroom of the Hilton Hotel.

Today American industry faces a growing problem in combating corrosion, it was stated by C. L. Chase of General Electric's Chemical Division, speaking at the January meeting of the **LOS ANGELES PAINT PRODUCTION CLUB.** The

Some of the members of the Convention Committee at a recent meeting. From left to right, standing: J. H. Monaweck, H. J. Weisner, R. Wysong, H. Hansen, E. Olson, L. Glassner; seated: R. J. Hazucha, P. Glab, R. F. Ledford, C. Kelly, general chairman; Mrs. Longfield, C. F. Nixon, H. A. Gilbertson, J. M. Andrus.

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Gives your products extra salability!

Growing scarcity and skyrocketing costs of plating materials don't worry Houghto-Black users.

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losses from corrosion, which reach multi-billion dollar proportions in so-called normal times, present even a greater challenge at the present in the execution of preventive efforts because of critical material shortages.

The individual protective coatings formulator, as well as the protective coatings industry, are vital factors in helping American Industry solve this problem, Mr. Chase said. Using new approaches recently made available by chemical manufacturers, the coatings industry can be aided greatly in solving many of its tough coating problems.

meetings

OF INTEREST TO FINISHERS

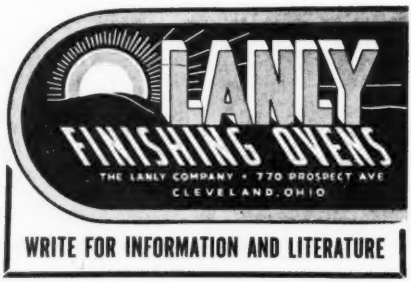
Mar. 15. Annual Educational Session and Banquet, Dayton Branch, A.E.S., Biltmore Hotel, Dayton, Ohio.

Mar. 24-25. 1952 Annual Meeting, American Hot Dip Galvanizers Association, Inc., Drake Hotel, Chicago, Illinois.

Apr. 3-5. Pacific Coast Production Clubs' Symposium and Paint Industries' Raw Material and Equipment Exhibit, Biltmore Hotel, Los Angeles, California.

Apr. 19. 16th Annual Technical Session and Banquet, Boston Branch, A.E.S., Hotel Statler, Boston, Massachusetts.

Apr. 19. 10th Annual Educational Session and Banquet, Rockford Branch, A.E.S., Rockford, Illinois.



Apr. 21-22. 34th Annual Meeting, American Zinc Institute, Hotel Statler, St. Louis, Missouri.

Apr. 26. A.E.S. Indianapolis Branch Educational Session and Dinner-Dance, Athletic Club, Indianapolis.

Apr. 28-30. Spring Meeting, American Oil Chemists Society, Shamrock Hotel, Houston, Texas.

Apr. 27-May 1. 54th Annual Meeting, The American Ceramic Society, William Penn Hotel, Pittsburgh, Pennsylvania.

May 4-8. 50th Anniversary Meeting, The Electrochemical Society, Benjamin Franklin Hotel, Philadelphia, Pennsylvania.

June 16-20. 3rd Industrial Finishing Exposition and 39th Annual Convention, American Electroplaters' Society, International Amphitheatre, Chicago, Illinois.

June 23-27. 50th Anniversary, American Society for Testing Materials, Hotels Statler and New Yorker, New York, New York.

Sept. 10-12. 14th Annual Shop Practice Forum, Porcelain Enamel Institute, University of Illinois, Urbana, Illinois.

Oct. 22-24. 21st Annual Meeting, Porcelain Enamel Institute, Greenbrier Hotel, White Sulphur Springs, West Virginia.

NECROLOGY

Detrex Corporation has announced the death on January 22 of **EDWIN F. LANKES,** Eastern region supervisor.

MORRIS E. LEEDS, founder and chairman of the board of Leeds & Northrup Company, manufacturer of electrical instruments, automatic controls and furnaces, died Friday, February 8, at Lake Wales, Florida.

Honored by many organizations, Mr. Leeds belonged to the American Institute of Electrical Engineers, American Association for the Advancement of Science, American Society for Testing Materials, American Physical Society, American Society for Metals, Academy of Natural Sciences, American Philosophical Society, Franklin Institute, Metal Manufacturers' Association of Philadelphia, and the Association of Scientific Apparatus Makers of the United States.

There is only *one* **PENTRATE** . . . the oldest name in black oxide finishing. Since 1923, it has stood as the leader in uniformity, dependability and quality. Discerning metal finishers have used over *twelve million* pounds. This label is your assurance of reliability and continuous research for an even better product — insist on it!

Pentrate meets U. S. Gov. Spec. 57-0-2, Type III, Class A.

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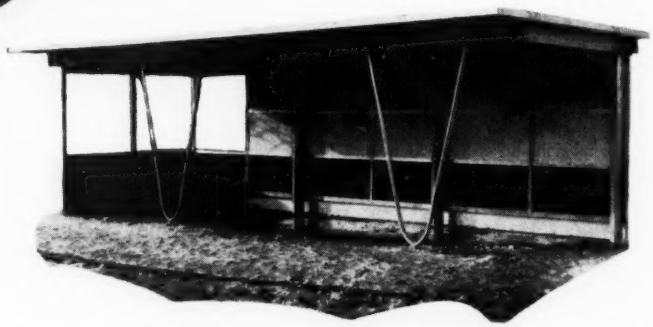
SPRINGFIELD 1, MASSACHUSETTS

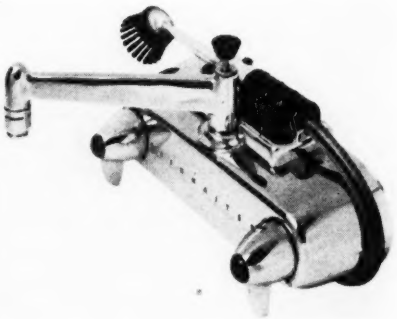
Finishes



The bus shelter, introduced by the Cleveland Transit System, is of highly modernistic design. The 8 by 24-foot shelter has a roof made of deep corrugated aluminum sheets bordered by an aluminum gutter. Walls are made of glass and steel panels which have been finished with porcelain enamel in blue and ivory. An inverted "wishbone" of 2-inch aluminum tubing supports the roof at the open end.

(Photo courtesy Ferro Corp., Cleveland 5, Ohio)

The Dishmaster, a boon to the housewife, has chromium finish. The spout, which is made of brass, and the handles, which are made of a zinc alloy, are finished with a copper-nickel-chromium plating system. The cover is a zinc alloy die casting and is also finished with a copper plate, bright nickel plate, and a final chromium plate. All inside surfaces which are in contact with water are of copper.



(Photo courtesy Gerity-Michigan Corp., Toledo 4, Ohio)

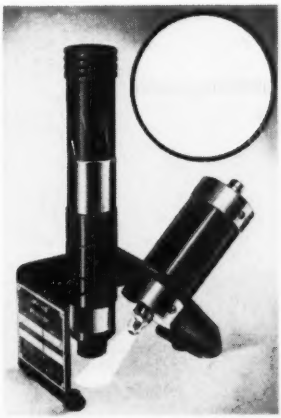
that aid in appearance and utility

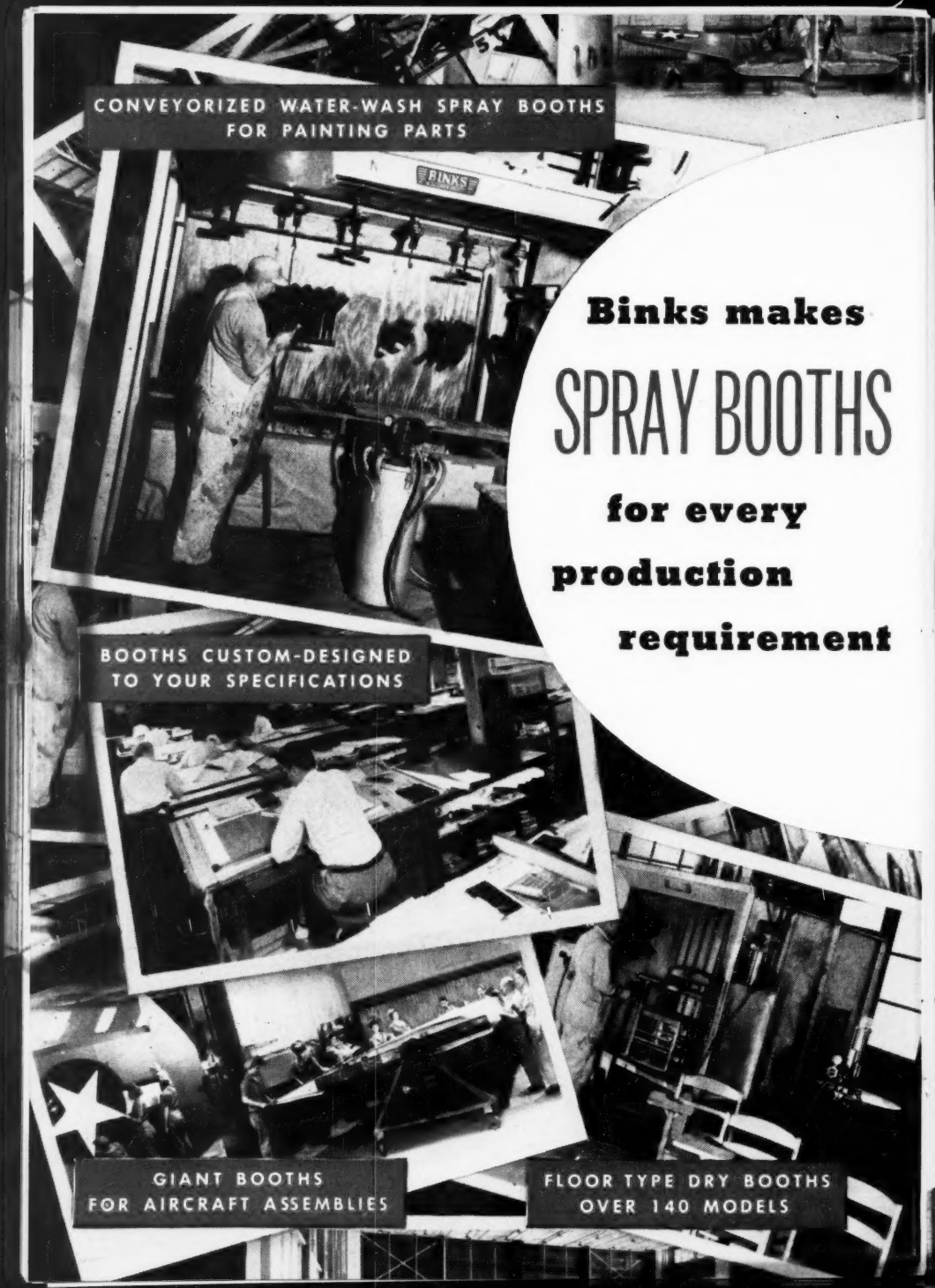
This popular aluminum pitcher and tumbler set is anodized after being highly polished, thoroughly degreased, dipped in a caustic wash, and rinsed in water. Following anodizing in sulfuric acid, the articles are neutralized in water, submerged in a dye, rinsed in cold water, and sealed in a nickel acetate bath. Rinsing in hot water and buffing are the last two steps in the process that produces this highly attractive finish.

(Photo courtesy West Bend Aluminum Co., West Bend, Wis.)

This industrial microscope, designed for use in the laboratory, shop, or for production, has a built-in illumination, a measuring scale, and high quality optics. It is finished in black Du Lite, polished chrome, and deep maroon baked enamel.

(Photo courtesy Clarkstan Corp., Los Angeles 34, Calif.)

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GIANT BOOTHS
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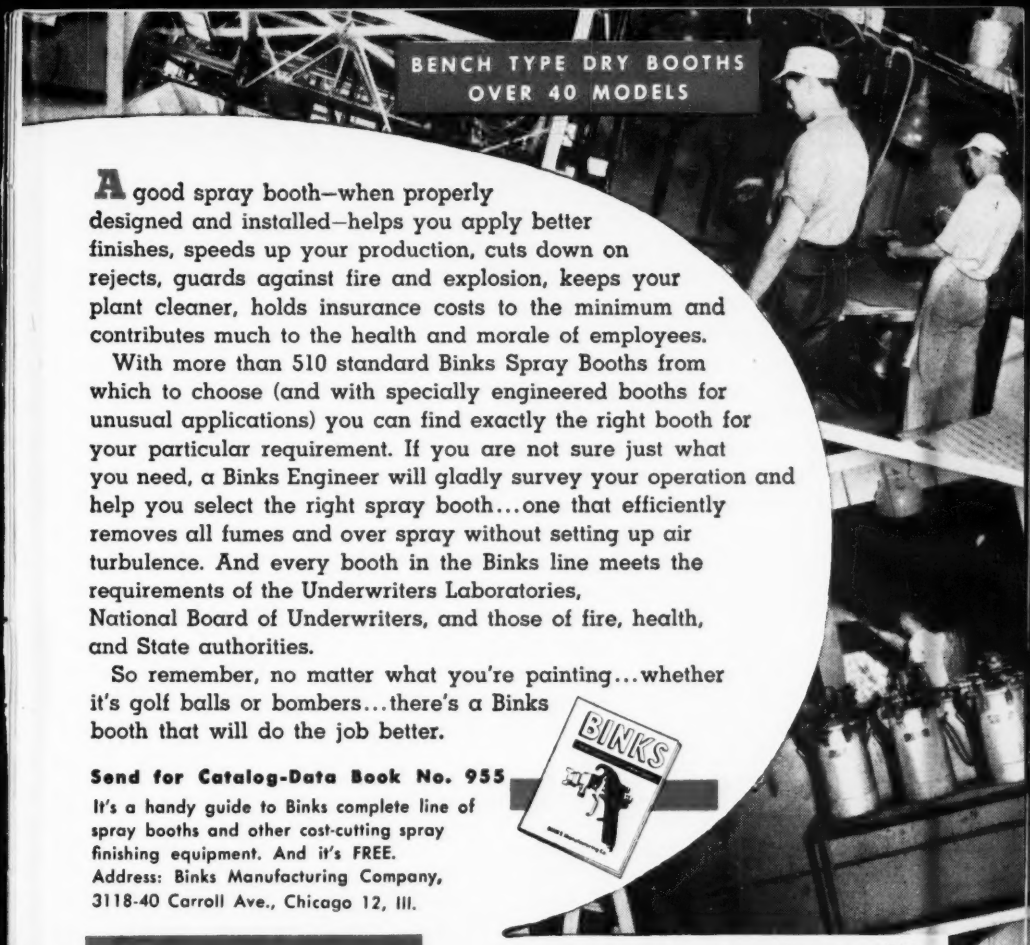
OVER 140 MODELS



A good spray booth—when properly designed and installed—helps you apply better finishes, speeds up your production, cuts down on rejects, guards against fire and explosion, keeps your plant cleaner, holds insurance costs to the minimum and contributes much to the health and morale of employees.

With more than 510 standard Binks Spray Booths from which to choose (and with specially engineered booths for unusual applications) you can find exactly the right booth for your particular requirement. If you are not sure just what you need, a Binks Engineer will gladly survey your operation and help you select the right spray booth...one that efficiently removes all fumes and over spray without setting up air turbulence. And every booth in the Binks line meets the requirements of the Underwriters Laboratories, National Board of Underwriters, and those of fire, health, and State authorities.

So remember, no matter what you're painting...whether it's golf balls or bombers...there's a Binks booth that will do the job better.

Send for Catalog-Data Book No. 955

It's a handy guide to Binks complete line of spray booths and other cost-cutting spray finishing equipment. And it's FREE. Address: Binks Manufacturing Company, 3118-40 Carroll Ave., Chicago 12, Ill.

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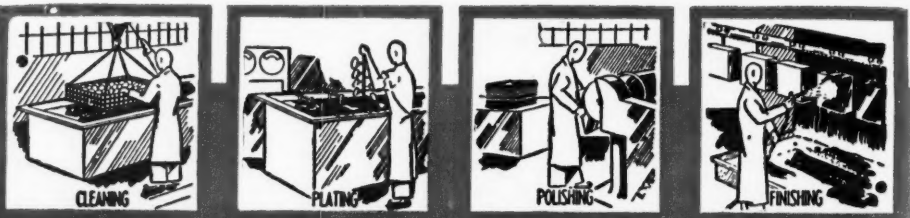


New • EQUIPMENT • MATERIALS • PROCESSES

Plastic Spray Booth Material

A vinyl-type paint spray booth coating material called Vincote has been placed on the market by Detrex Corp., Detroit 32, Mich. Specially developed for use on the side walls of both water-wash and dry paint spray booths, the material possesses rapid drying properties and when sprayed on a booth wall forms a tough plastic film with exceptionally high tensile strength. Vincote is impervious to paint, enamel, lacquer, and water, it is claimed.

The low adhesive properties of this material make booth maintenance a very simple and rapid operation. When the paint overspray has built up to a point where removal is indicated, the coating and all oversprayed paint is merely peeled off in large, easily removed sheets. Vincote eliminates the use of such hazardous materials as grease and paper on spray booth walls.

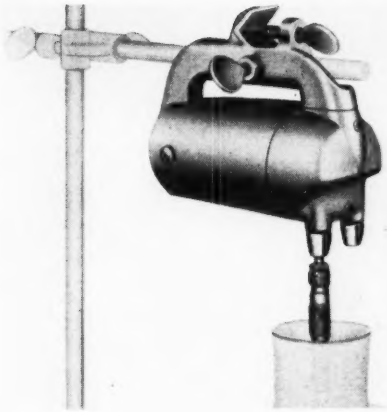
Vincote can be applied to booth walls with any standard spray equipment. A gallon of the material will cover from 275 to 400 square feet depending upon the desired thickness.

Oversprayed paint is shown being peeled off wall of spray booth

"Mighty Midget" Stirrer 3-6-9

Laboratory Industries, Inc., 4710 W. North Ave., Chicago 39, Ill., has announced its "Mighty Midget" Stirrer 3-6-9, a multi-speed stirrer with three predetermined speeds best suited for general laboratory stirring, 300, 600, and 900 r.p.m. The motor is series wound and pulls 65 watts. Horsepower is $\frac{1}{76}$. The unit has plenty of power at all speeds and carries the Underwriters Approval.

A specially designed bracket permits the stirrer to be mounted in any position. In the normal position the center of gravity is below the support rod which



"Mighty Midget" Stirrer 3-6-9

prevents accidental turnovers and breakage of beakers. The stirrer can be mounted by sliding on a rod or it can be hooked on and removed without disturbing any setup. The special bracket permits the stirrer to be mounted at any center distance required.

The unit is equipped with a two-position mounting bracket, 8-foot rubber covered cord and plug, 8-inch aluminum support rod, and a chuck which is a special three-jaw self-adjusting type and holds stirring rods of ¼-inch diameter.

All-Purpose Industrial Rectifier

Electronic Rectifier Co., Inc., Rochester 2, N. Y., has announced its Selenium Rectifier which operates from standard three-phase a.c. power lines and turns out 230 volts of direct current with sufficient capacity to run large d.c. motors up to 25 h.p., or energize electromagnets or other d.c. equipment.

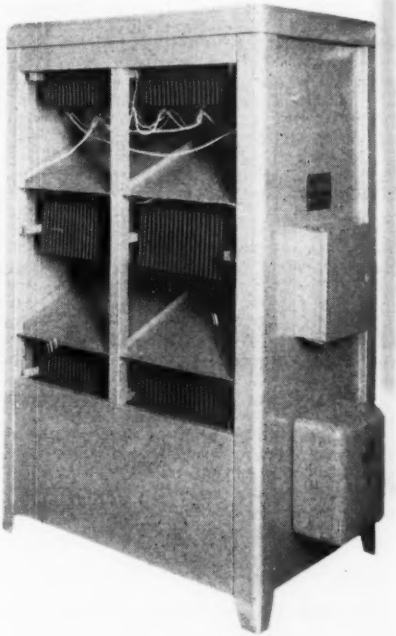
Main features of this rectifier claimed by the manufacturer are: no moving parts to wear or require attention; no noise; no tubes or other perishable parts; overload and surge capacity up to 600 per cent of normal rating; very low standby power consumption; high operating efficiency (approximately 80 per cent); instant operation, no time lag or warm-up period required.

The unit is self-contained, complete in one pressed steel cabinet 26 x 40 x 65 inches high. It requires no external controls or panelboards. Other models are available for loads from 3 to 50 h.p.

Thermoswitches

Two Theromswitch units, precision thermostats manufactured by Fenwal Incorporated, Ashland, Mass., are available which enable a hot vapor degreaser to operate at highest efficiency while its heating elements are protected from destructive overheating.

Grease-coated or grimy materials, suspended in the degreasing tank, are effectively cleaned by the hot solvent vapors



All-Purpose Industrial Rectifier

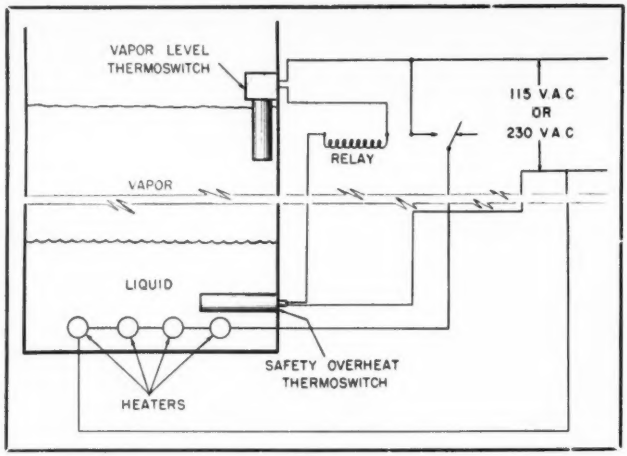


Diagram showing Thermoswitches in use in a hot vapor degreaser

(trichlorethylene or perchlorethylene) generated by heating the reservoir of solvent at the bottom of the tank. The hot vapor, condensing on the surface of the material, washes off the grease or grime which then collects as sludge at the bottom of the tank. Two control problems arise in the operation of this open-top degreaser: preventing the heavier-than-air vapor from overflowing the top of the tank, and protecting the heater from burning out because of the insulating effects of the sludge accumulation.

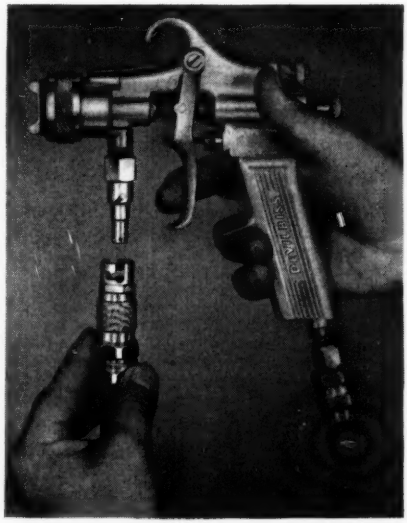
To control the vapor level, a sensitive device capable of quick response is required. This response is provided, it is stated, by a normally-closed Thermoswitch inside the tank at the "danger" level. The thermostat, which has a sensitivity of less than ±0.5 deg. F. and is set to function at 170 deg. F., "senses" the hot vapor rising to its level and quickly opens the heater circuit. The heater remains off until the vapor recedes to a safe level, whereupon the thermostat, activated by the drop in temperature, again puts the heater into operation.

The heater elements at the bottom of the tank are protected from overheating and possible destruction by the action of a second, normally-closed Thermoswitch. This unit is set at 235 deg. F. Should the insulating action of the accumulated sludge cause the temperature to rise to 235 deg. F., the thermostat cuts off the power to the heater circuit. After the temperature drops to a safe level, the thermostat again functions and puts the heater into operation.

DeVilbiss Fluid Connector

A quick twist and a paint spray gun can be switched from one color to another, without fuss or tools, using spray gun equipment which has been developed by the DeVilbiss Co., Toledo 1, Ohio.

Made of lightweight, durable aluminum, the fluid hose connector is self-sealing by virtue of a spring-type, ball valve set against a synthetic rubber seal.



DeVilbiss Fluid Connector

magic . . .
in your hands

This book, in your hands, may well solve all your problems of BLACK OXIDE finishes for metal.

Here is data on tanks, temperatures, cleaners—and the facts about BLACK MAGIC Type A BLACKENING SALTS.

This new BLACK OXIDE finish easily blackens heat-treated pieces, uses less salt, operates at a lower temperature, requires no rectification by cyanide additions, requires only one tank, one salt.

BLACK MAGIC MEETS GOV'T SPECS 57-0-2C Type 3, 51-70-1A Finish 22.04, AMS 2485 and all other black oxide specs.

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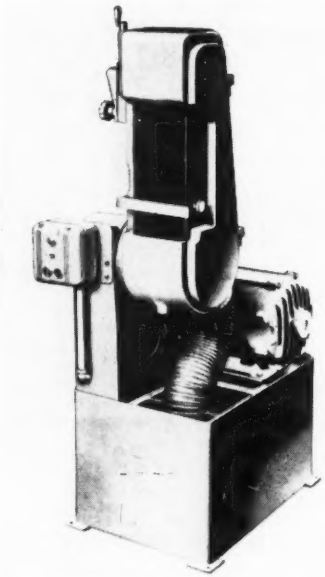
QUALITY PRODUCTS OF CHEMICAL RESEARCH

When the connector is locked in place, the valve is opened for use. The special rubber seal is imprevious to paint or other materials used in spraying.

Designed for use with ⅜-inch fluid hose, the fluid connector is identified as DeVilbiss Type HC-4575. According to the company, the device completely eliminates the need for time-consuming, tool-using, gun-cleaning halts in production of painted surfaces. The ball valve is leak-proof and a bayonet principle used in locking the connection provides a sure and permanent connection.

Abrasive-Belt Grinder for Large Area Surfacing

An all-purpose belt grinder which is adaptable to a wide range of grinding operations has been placed on the market by the Porter-Cable Machine Co., Dept. PR-3, Syracuse, N. Y. Equipped with a standard 6-inch belt which runs over a 12½-inch platen, the grinder handles jobs which previously had been run on wider belts in production lines, job shops, and maintenance and repair departments.



Porter-Cable Model 506 Abrasive Belt-Grinder

The grinder, designated Model 506, is used primarily for free-hand applications on work which requires flat surfaces, deburring, squaring, chamfering, rounding, and polishing.

Rugged and compact, this machine can be changed over from vertical to horizontal operation in only one minute by simply loosening two hex nuts. For smaller pieces, particularly for those having more length than thickness, the machine is usually set and squared in its vertical position. The work is supported by a work rest and squared with the platen.

This unit, with a built-in coolant system, may also be used for grinding materials requiring a wet abrasive belt. The 24-gallon tank has a large chip basket to facilitate clean-out. The pump forcibly sprays coolant on the belt within the machine to flush grindings from the belt. The coolant then runs downward through a large flexible dust tube and is filtered twice before re-entering the pump.

Standard equipment for the dry model includes the adjustable motor platform; removable, reversible cast iron platen; work rest; chip basket. The wet model includes all the dry model equipment plus a coolant system with belt-driven pump, splash guard, and coolant filter.

The drive unit for the machine is 3 h.p., 220/440 volts, 60 cycle, 3 phase, 1750 r.p.m., totally-enclosed motor.

Totrust Instant Dry Metal Coat

A combination rust inhibitive primer and finish coating for all metal painting, including galvanized, aluminum, iron or steel, rusted or clean, painted or unpainted, new or old, or for exterior or interior surfaces, has been marketed by The Wilbur & Williams Co., 130 Lincoln St., Brighton 35, Mass. The one-coat primer and finish is said to possess the quick-drying and weather-resistant features usually associated only with baked coatings.

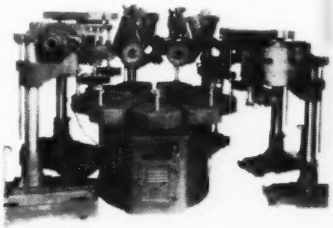
Totrust Instant Dry Metal Coat provides excellent adhesion, it is claimed, and normally dries in 10 to 15 minutes. Manufactured in a variety of colors, the company is offering to supply a half-pint sample free of charge to any industrial user requesting it on his business letter.

Apple Polishing is a HAND OPERATION

BUT METAL polishing is not — at least it shouldn't be, not when Packer-Matic machines can buff, grind, or deburr far faster and more efficiently than slow, costly hand finishing. Packer-Matics increase uniformity, save floor space, and cut labor cost — one unskilled operator replaces many skilled finishers. If you consider your volume too low or your products too varied for completely automatic equipment, let us run a test on your product in our plant, without obligation.

Your factory-trained Packer representative can give you complete information about continuous, indexing, or straight-line Packer-Matics . . . about the many unique features of Packer machines, designed to meet specific requirements, built to keep meeting them through years of continuous service.

Your Packer-Matic is thoroughly tested before it leaves our plant, and fully guaranteed for one year. Investigate Packer-Matic finishing today: write to the Packer Machine Company, Meriden, Connecticut.



No. 14-9 Rotary Indexing, equipped with work spindle oscillating units.

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AUTOMATIC MACHINES FOR BUFFING • POLISHING • DEBURRING • GRINDING

THE PACKER MACHINE COMPANY • MERIDEN, CONN.

For more complete information on products and processes use READER SERVICE CARDS inside covers.

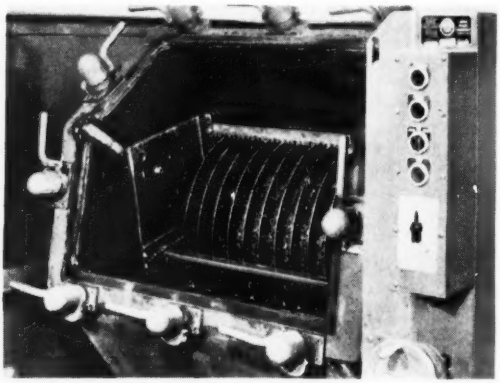
Roto Finish Stationary Fixture Machine

An addition to the line of mechanical finishing machines manufactured by the Roto - Finish Company of Kalamazoo, Michigan, is the DW 30-36-1SF, especially designed to effectively finish disc-type circular parts. The machine, of the stationary fixture type, uses the directional flow of the finishing media to uniformly and efficiently produce desirable results.

Model DW 30-36-1SF has a single 30⅛ x 35¼-inch I.D. rubber-lined compartment with an 18-cubic foot capacity. Large door opening facilitates handling of the large parts for which the machine was designed. Patented quick action cam locks, used for closing the compartment door, have spring-loaded pressure releases, which prevent excessive pressure build-up in the processing compartment.

The model features push-button operation with all controls located on one compact panel. Once the machine is started, an automatic timer is available for controlling the operation from 0 to 20 hours without attention by an operator. A variable speed power unit with a conveniently located remote control handle enables the operator to vary the speed of the cylinder from 10 to 30 r.p.m.

The lower part of the housing is fully-enclosed to prevent chips and water from lodging behind framework, making the machine easier to clean and maintain. A special Roto-Finish hoist pan is utilized for loading and unloading operation and is included as standard equipment.



Roto-Finish Model DW 30-36-1SF Stationary Fixture Machine

Metal Cleaner

Developed especially for use in pressure washers, Kelite Formula 973, product of Kelite Products, Inc., 3401 W. Touhy Ave., Chicago 45, Ill., is a heavy duty, non-foaming cleaner of brass, iron, steel, bronze, magnesium, and all other metals except aluminum and aluminum alloys.

The cleaner is claimed to possess exceptional penetration and oil emulsifying abilities. Its repression powers keep hard water scale from forming and will eventually remove old deposits already formed. Excellent rinsing properties are said to be built into the cleaner.

The efficiency of a pressure washer depends not only upon the compound but also upon the contact angle of spray jets, the volume, and temperature of the cleaning solution on the work. Kelite service engineers are equipped to check these points when the Kelite process is installed.

Processing Conveyor

Shuler Conveyors, Inc., 43 Hutcheson Pl., Lynbrook, N. Y., has developed a Work Processing Transfer for use with overhead conveyors. It consists of drop sections, placed above processing tanks, onto which the parts are transferred from the conveyor without the use of intricate mechanisms. The conveyor comes to a stop, the work is dropped into the tanks for the desired period of time, and is then brought back to conveyor level. The conveyor starts automatically, the work is transferred back onto the conveyor, and moves on, until the operation is repeated.

Clean and Phosphate
in ONE OPERATION!

PHOSCOTE, the new type product of Pelron Corporation, does the job quicker, better, at less cost. Prevents under-film rust and corrosion — adds life to finished product.

Increases paint-adherence through fine, evenly dispersed phosphate coating.

• Non-Toxic
• Non-Corrosive
• Easy To Use

Does not sludge out in operating tank. Economical to use on steel and aluminum due to low concentration.

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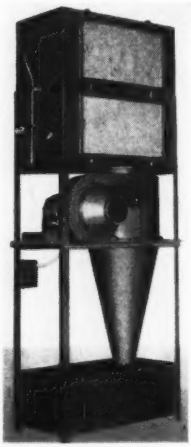
Manufacturers of Phosphating Chemicals That Conform to Gov't. Specifications

Large Capacity Dust Collector

A large capacity industrial dust collector which requires only 8 square feet of floor space yet is capable of collecting the dust from as many as ten grinding wheels in simultaneous operation has been marketed by the Aget-Detroit Co., 207 Main St., Ann Arbor, Mich. The collector, designated as the Dustkop Model 3050, has a rated capacity of 3,630 cubic feet of air per minute at a static suction of 6 inches measured on an 8-inch inlet pipe.



Dustkop Model 3050 Dust Collector

The dirt-laden air is drawn into the collector by means of a self-clearing paddle wheel fan driven by a 5 h.p. motor. The first stage cleaner is a cyclone separator of predetermined operating efficiency; a second-stage cleaning is effected by a heavily compressed fiberglass filter which cleans the air and permits its return to the working space for a consequent saving of heat.

Installation requires only the locating of the unit and connecting to electrical power and the piping system. Being entirely self-contained, the unit is portable and can be moved as subsequent changes in production setup are made. Floor size of the unit is 29 x 50 inches, with the overall height being 132 inches. The unit is available for use on 220 or 440-volt 3-phrase 60-cycle power.

Primer for Hard-to-Finish Materials

The United-Lacquer Manufacturing Corp., 1001 W. Elizabeth Ave., Linden, N. J., has developed a fast-drying black universal primer which clings even to polished chrome, stainless steel, zinc, or glass, establishing a base which anchors a protective coating. Without this coating, it is stated that military instruments, devices, and weapons tarnish and otherwise are rendered useless by atmospheric conditions.

The vinyl plastic-base primer, VB 282, adheres well to brass, polished chrome, stainless steel, glass, aluminum, zinc plating, and molded phenolics. According to the manufacturer, its extreme flexibility allows parts to be formed, extruded, or blanked after they are finished.

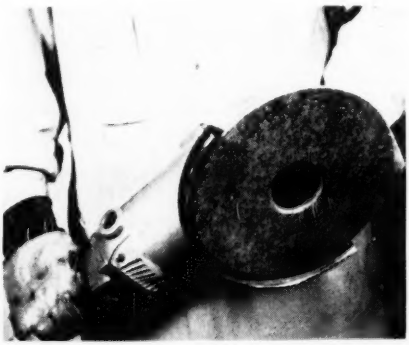
Applicable by dipping or spraying, VB 282 dries in 15 minutes, thereby eliminating need for baking the primer coat and making possible more productive use of a factory's finishing facilities.

The primer's excellent resistance to salt spray, humidity, abrasion, and solvents is claimed to permit it to better maintain its initial strength when subjected to any of these conditions.

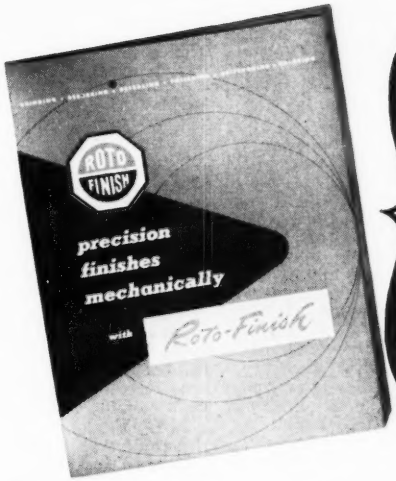
Norton BFR Grinding Wheel

Norton Co., Worcester 6, Mass., has announced a reinforced, flexible, hub-type grinding wheel known as the Norton BFR Wheel. With the BFR, an operator can rough grind, finish grind, and notch, all with the same wheel.

Designated for use on "right angle" or "sander" type portable grinders, the wheel is made of carded web material impregnated with abrasive grain. According to the manufacturer, it is light, possesses unusual strength due to patented construction, is sufficiently flexible to permit blending of contours, and does a good polishing job. Generally, the wheel



Norton BFR Grinding Wheel mounted on a portable grinder



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Here's a new, fully illustrated catalog that shows you how you can improve the surface of your products at lowest costs with Roto-Finish, an original precision tumbling process. Learn how you can save money and manpower with Roto-Finish's wide choice of machines, equipment and materials that combine with Roto-Finish's Engineering Service and "know-how" to give you a practical solution to your finishing problems. Prove it to yourself. Write for your free copy today.

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ORIGINATORS OF THE ROTO-FINISH PROCESS

Illustration shows spoon on right which was plated by the Silver-Lume bright silver plating process and conventional silver plated spoon on left. Both spoons appear exactly as taken from plating tanks.

is used to smooth down welds, blend surfaces on contours, and notch risers in all kinds of castings.

Unusual strength is achieved by a safety web built into the back of the wheel. Should breakage occur, the web is designed to hold pieces together until the machine can be stopped.

Bright Silver Plating Process

Hanson - Van Winkle - Munning Co., Matawan, N. J., has announced a commercial silver plating process which now makes it possible to obtain bright silver plate without buffing or scratch brushing. Called Silver-Lume, the process eliminates the usual buffing and brushing; produces a noticeably more tarnish-resistant surface; has a wide bright range; requires no special equipment; produces an excellent deposit - distribution and uniform color; and is easily controlled.

Conventional plating equipment as used for ordinary cyanide silver baths is satisfactory, it is stated. A new bath is prepared from silver cyanide, potassium cyanide, and potassium carbonate with small amounts of Silver-Lume Brighteners A and B. The potassium salt solution is preferred over one prepared from sodium salts as the latter has a much narrower bright range. Existing solutions can, in most cases, be converted to the Silver-Lume Process. Sometimes, however, such baths require special treatment, for example, with activated carbon to remove undesirable impurities. Old baths high in sodium salts, especially sodium carbonate, may require increased concentrations of both A and B Silver-Lume brighteners with subsequent electrolysis for several days in order to obtain a wide uniform brightness range.

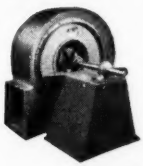
According to Hanson - Van Winkle - Munning, the Silver-Lume Process may be operated over a wide range of current densities and gives fully bright deposits at current densities higher than those used in most silver plating operations. The permissable current density depends principally on the metal content, the temperature, and degree of agitation. High metal content, high temperature, and vigorous agitation permit the maximum current to be used. The temperature may vary in the bath from 70-120 deg. F. Under favorable conditions current densities of up to 55 asf. can be employed.

Deburring Compound

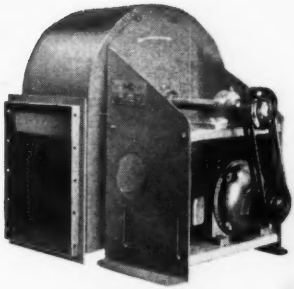
A deburring and barrel finishing compound has been marketed by the Blue Magic Chemical Specialties Co., 2135 Margaret St., Philadelphia 24, Pa. Designated as No. S-12 Compound, it is claimed to reduce deburring time by as much as 75 to 90 per cent, and also to produce absolutely uniform radii on parts such as bearing races and retainers.

Another advantage claimed for No. S-12 Compound is that it is a good temporary rust inhibitor. A load of parts, deliberately dumped at the end of a deburring cycle, without rinsing or drying, and left exposed for three hours, showed no indications of rust formation.

The compound is highly concentrated, non-dusting, white in color, and of granu-



nyb General Purpose FANS



Capacities from 400 CFM to 18,000 CFM.

Portable, self-contained units for Class I industrial and ventilating applications. Recommended for their ease of installation, low maintenance and space saving features. Made in three types and eight basic sizes. Both direct connected and belt driven models.

Laboratory tested, accurately rated and fully guaranteed in strict accordance with Standard Codes.

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nyb THE NEW YORK BLOWER COMPANY

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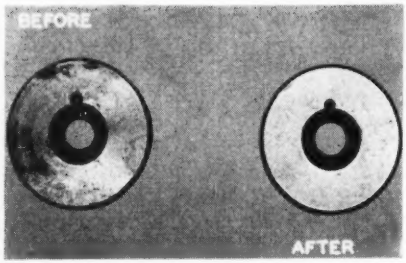
FACTORY, LAPORTE, INDIANA



Steel washer before and after being deburred and barrel finished with No. S-12 Compound

lar composition. The manufacturer is offering its laboratory facilities and also free samples of S-12 Compound for steel deburring and finishing test runs.

Dantoin

Dichlordimethylhydantion is now being produced on a tonnage basis by the Glyco Products Co., Inc., at Natrium, W. Va. It is being sold under the trade mark, Dantoin.

Dantoin is a fine white powder with an available chlorine content of 66 per cent (minimum). It has a mild hypochlorous odor; melting point of 130 deg. C. and sublimes at 100 deg. C. It is only slightly soluble in water but is soluble in many organic solvents.

Improved Dy/Chek Formula

Completion of an improved and nontoxic Dy/Chek Formula has been announced by Turco Products, Inc., Terminal Annex 2649, Los Angeles 54, California.

The Dy/Chek method of inspection is basically a "hide and seek" process. Following precleaning, a red dye is applied to the surface being inspected. After being allowed to dwell sufficiently long for it to "hide" in any flaw or defect—no matter how small—that extends to the surface, the dye is removed from the surface of the part being inspected. A white developer is then applied to the surface, which "seeks" out the dye hidden in the flaw. As the developer dries, it pulls the hidden dye to the surface. The red dye thus bleeds into the white developer, marking with photographic clarity any defects, as well as their extent, that may be present.

Applicable by spraying, dipping, or brushing to both ferrous and non-ferrous metals, Dy/Chek can be used not only in mass production inspection of parts under factory conditions but also by a single mechanic or inspector in examining parts in the field.

Industrial Laundry Detergent

Pensal W, a "one-shot" detergent, specially designed for industrial laundry on heavily soiled overalls and wipers, has been developed by the Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia 7, Pa. This heavy duty detergent, designated the work horse of the Pensal line, is composed of a combination of chemicals which completely removes the heavy grease and ground-in dirt soils encountered in these industrial classifications.

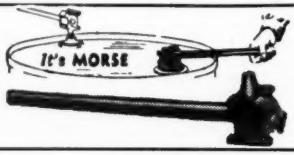
Containing ingredients that permit quick and thorough penetration into the cloth, the product is claimed to ensure improved cleaning efficiency in conjunction with shorter washing formula.

Squeez-O-Matic Burette Unit

A burette unit featuring a plastic (polyethylene) reservoir which requires only a squeeze to fill an automatic self-leveling burette has been announced by Hagan Corp., 323 Fourth Ave., Pittsburgh, Pa. The "Squeez-O-Matic" is said to be easy and simple to use, a time-saver, and requires only one hand.

Use of a plastic reservoir, a specially-machined polyethylene bottle, not only

Send NOW for this FIT-ALL
DRUM PLUG WRENCH
Instantly loosens, tightens 95% all plugs or bungs in steel drums. Has 16" extra-strong steel tubing handle. Wgt. only 2 lbs. Order 1 or more today!



THOUSANDS IN USE saving time, labor, accidents!
SATISFACTION GUARANTEED... **$3.00**
Non-sparking type $4.60
Plus Parcel Post
MORSE MFG. CO., Inc.
125 Dickerson, Syracuse 2, N. Y.

Both steel boxes were top-coated with the same high-grade enamel; both had been cleaned thoroughly before finishing . . . but one had been primed with STANTITE. Then both were subjected to a salt spray under laboratory test conditions: after 93 hours the first box showed 75% rust failure—but the STANTITE-primed box showed no film failure after 500 hours!

Besides preventing corrosion and rust creep STANTITE Spraying Primer and STANTITE Clear Primer (for dipping) provide excellent adhesion to all types of surfaces . . . may be used with most types of top coats. Created for application under air-dried or baked finishes, STANTITE dries rapidly, is unimpaired by any baking schedules.

Find out now what STANTITE can do for your product . . . for complete information write today to the Stanley Chemical Company, 21 Berlin St., East Berlin, Conn.

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Industrial Coatings

STANLEY CHEMICAL

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makes operation of the burette unit easier and simpler but also provides a container which is highly resistant to chemical attack and will not contaminate standard titrating solutions, it is claimed. Another feature of the Squeeze-O-Matic Burette Unit, available in 25 and 10 ml. sizes, is the special base which holds the plastic bottle and also provides a convenient and stable platform for beaker, flask, or dish. The base, also made of special plastic material, is extremely resistant to either mechanical damage or chemical attack.

A molded stopper arrangement for the plastic bottle is designed to hold the burette rigidly in position and provide a firm seal between bottle top and burette.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

Hoff Crafter Products. Hoffman Co., 41-43 N. Penn St., York, Pa., has catalogs and data sheets available on its line of metal baskets, dippers, strainers, and containers. The baskets, made in various mesh sizes, are made from steel, stainless steel, or Monel and are available in standard sizes or tailor-made for specific applications.

Water Conditioning. A 20-page bulletin covering the various methods of conditioning water and the purposes served by each may be obtained from the Elgin Softener Corp., Elgin, Ill. Featured is an improved water softener of "double-check" design which gives up to 44 per cent greater capacity and guards against loss of zeolite. **Bulletin 611** tells how to make any water softener deliver from three to ten times more soft water. Chemical feed, zeolite—post treatment, zeolite—alkalinity neutralization, and split-stream dealkalization systems for boiler, process, and general water conditioning purposes are covered. Sections of the bulletin are devoted to latest type filters, purifiers, degasitors, zeolites, ion exchange resins, and water treatments for all purposes.

"Why Heat Processing" is the title of a four-page illustrated bulletin issued by the Selas Corporation of America, Philadelphia 34, Pa. **Bulletin S-7.2** emphasizes the increasing need for precision in heat processing. Principles of heat application to a wide variety of solid and fluid products are illustrated and described.

Pickling Chemicals for Steel. A folder describing an acid addition agent, Compound 42, Inhibitor 8, and Compound NR-37 may be obtained from Enthone, Inc., 442 Elm St., New Haven, Conn. These products have, respectively, been designed to stop fuming of acids, remove oil and rust at room temperature, stop attack on the base metal, and prevent rusting during drying.

"Facts About Zinc" is the title of an eight-page booklet available from the New Jersey Zinc Co., 160 Front St., New York 38, N. Y. The booklet has been edited to answer some of the questions uppermost in the minds of those concerned with zinc and its uses. Availability of zinc for this year and in the near future is among the points discussed in this booklet.

Metallizing. A four-page illustrated bulletin can be obtained from Metalweld Inc., 26th and Hunting Park Ave., Philadelphia 29, Pa., which describes proc-

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esses and uses; application, and how metallizing can be used for making mechanical repairs or protecting surfaces against corrosion contamination. Other industrial maintenance services are briefly outlined.

Fluorescence as a Means of Control in a Modern Enameling Plant. The January issue of the **"Enamelist Bulletin,"** published by the Enamelist Publishing Co., c/o Ferro Corp., 4150 E. 56th St., Cleveland 5, Ohio, is devoted to a new instrument for control in porcelain enamel plants. Known as the Fluoretor, the instrument works on the principle of fluorescence caused by ultraviolet light. Several uses of the Fluoretor are described in detail. A table of fluorescent ceramic materials with their colors and wave lengths and a list of fluorescent indicators with their pH range are also included.

"The Nefluoro-Photometer," a 16-page booklet published by the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa., explains the theory behind three important methods of analysis: colorimetry, fluorometry and nephelometry; and the operation of a precision instrument combining all three of these techniques in one simple electronic - optical system. The three-in-one instrument, the Neufluoro - Photometer, gives rapid (60-second) readings for a great variety of organic, inorganic, and synthetic materials, from acetone to zinc.

Clearwash 370, an alkaline white granular mixture which is used in water curtain spray booths, and will float over 90 per cent of the oversprayed paint, as well as eliminate foam in the spray booth, is the subject of **Technical Bulletin No. 129,** issued by Pilron Corp., 7740 W. 47th St., Lyons, Ill.

Dust Collectors. The complete line of Torit Dust Collectors is described in detail in a 24-page catalog issued by the Torit Manufacturing Co., Walnut and

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Exchange Sts., St. Paul 2, Minn. Included are both cabinet and cyclone-type dust collectors, in sizes ranging from ½ to 5 h.p. Also shown are a complete line of fittings and accessories, and a series of blueprint sketches giving the overall dimensions of each unit. The adaptability of Torit Dust Collectors to meet specific problems and production setups is shown by numerous illustrations.

Hanson - Van Winkle - Munning Co., Matawan, N. J., is offering a six-page pocket-size reprint of an article entitled **"Modern Hot-Dip Galvanizing"** by Raymond F. Ledford, electroplating engineer. The article tells how to get better coatings and at the same time reduce zinc waste.

Attributing the principal causes of zinc waste to dross formation, zinc oxide, and flux skimming, the article gives methods of reducing each waste classification.

The reprint provides galvanizing-cycle information, including acid concentrations, temperatures, and immersion times, and points out that the correctness of these factors are all important in obtaining the maximum coating from a given amount of zinc. Of particular interest in discussing temperatures is a graph indicating the amount of kettle-iron which will dissolve and form dross at temperatures ranging from 800 to 1500 F. Detailed information is also included on the zinc ammonium chloride type of flux into which work is immersed following the rinsing operation. In discussing this critical stage of the galvanizing process, the importance of the step in relation to the whole process is given and four tables are included indicating solution surface tension, stability when heated, relation of pH to purification, and iron-zinc ammonium chloride-iron cell effect.

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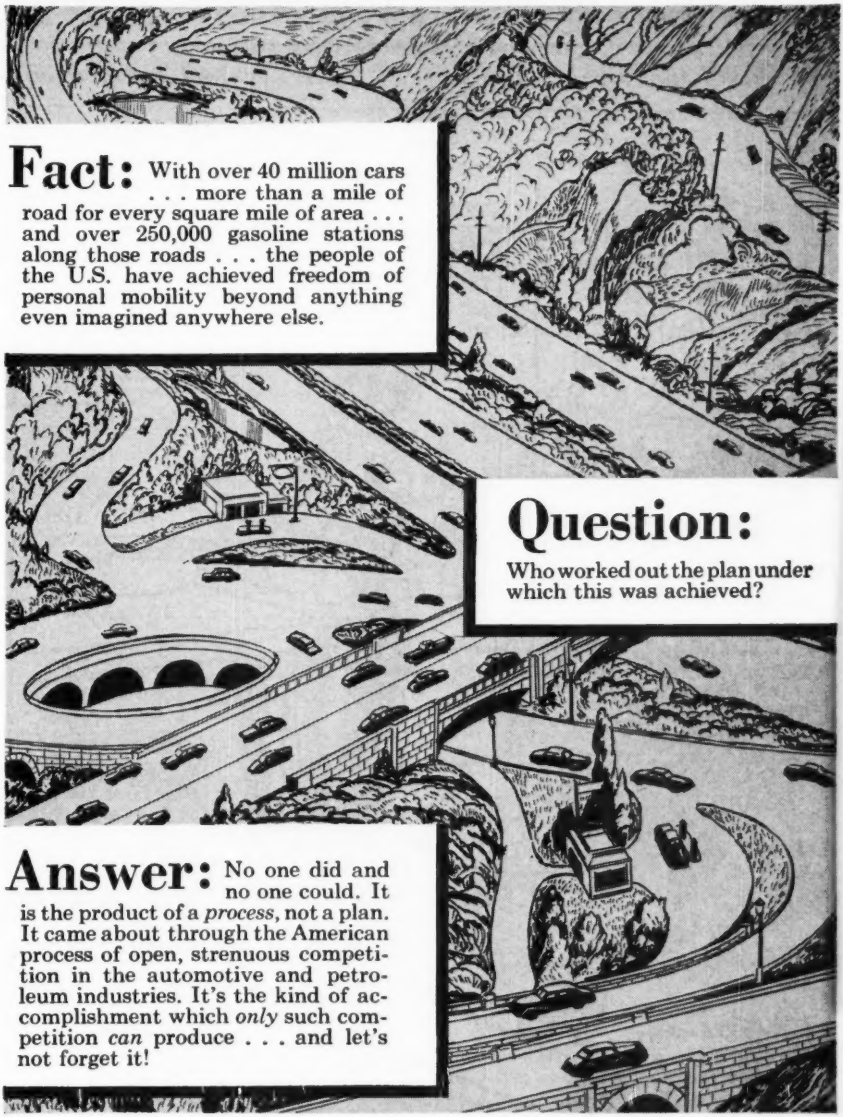
Metal Conveyor Belts. Ashworth Bros., Inc., 306 Shrewsbury St., Worcester 4, Mass., has announced the availability of its **Catalog 51.** This large, 44-page, two-color catalog depicts and describes the various types of woven wire belts and their many applications in various industries. Tables list specifications of the designs. Several pages are devoted to strict engineering details and list formulas for calculating chain pull, horsepower requirements, design factors, and methods of belt drive and belt take-up. Special attention is called to edge treatment and types of chains for positive drives.

Over 200 definitions of terms commonly used in industrial products finishing are contained in a 16-page booklet, **"Glossary of Industrial Coating Terms,"** produced by the General Industrial Division of The Sherwin - Williams Company. Copies may be obtained by writing on company letterhead to The Sherwin-Williams Co., General Industrial Division, 101 Prospect Ave., N. W., Cleveland 1, Ohio, or from any industrial zone office in Cleveland, Ohio; Grand Rapids, Mich.; Philadelphia, Pa.; Newark, N. J.; Chicago, Ill.; Atlanta, Ga.; Dallas, Texas; or Oakland, California.



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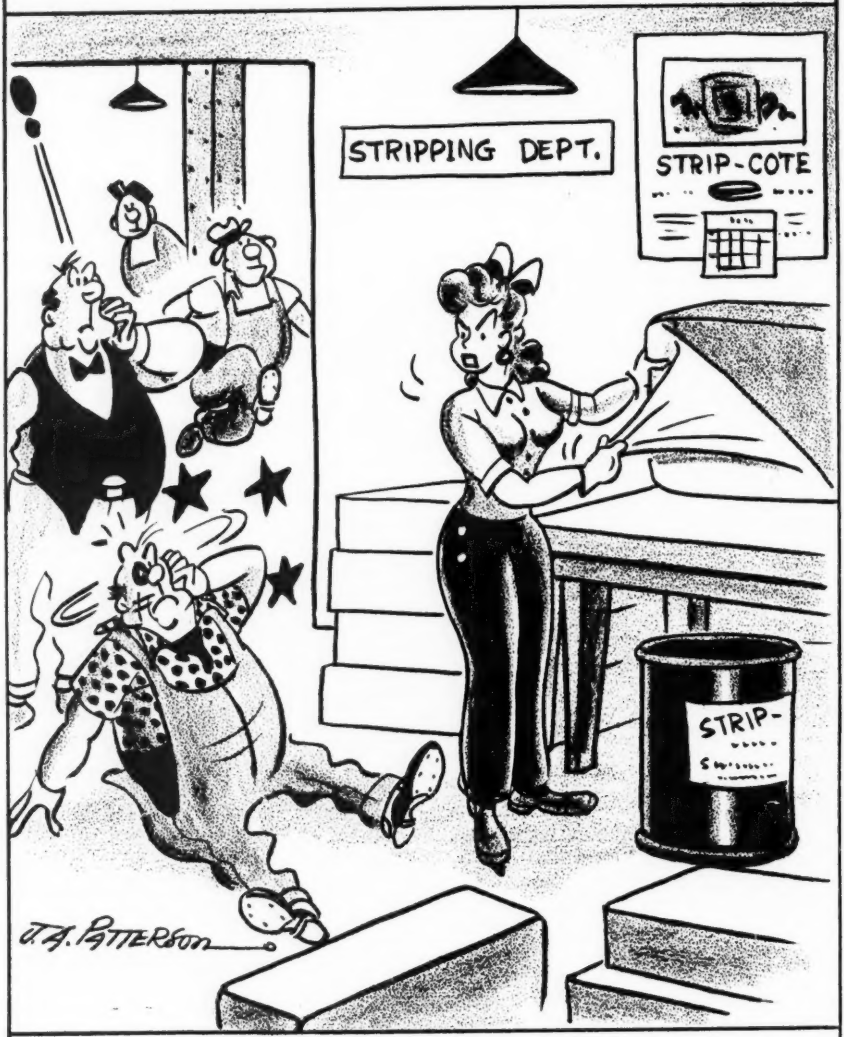

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A new sound color film, prepared under the direction of the Corrosion Engineering Section of The International Nickel Company, entitled **"Corrosion in Action,"** shows how corrosion works to cause an annual loss in industry and elsewhere estimated at over six billion dollars. It also shows how this damage can be avoided or controlled by various means, such as by the selection of corrosion-resistant materials, by the development of new alloys to meet given situations, by the use of electric currents to provide cathodic protection, and by other methods.

The film has been so produced that it can be shown in one part, in any combination of two parts, or in the full three-part length, depending on the time available. Each part requires 20 minutes' showing time.

In producing it, films were made at the big testing stations of the Kure Beach corrosion testing project, near Wilmington, N. C.; at the project's new laboratory at Harbor Island, N. C.; in industrial plants in various parts of the country; and elsewhere. The film took approximately a year to produce.

"Corrosion in Action" was made essentially for technical, educational and industrial groups, though its treatment is such that it can be understood by non-technical audiences. Bookings can be made through the Corrosion Engineering Section, The International Nickel Co., Inc., 67 Wall St., New York 5, New York.

"Conveyors That Pay Dividends" is the title of a materials handling film available free for group showing from the Lamson Corp., Syracuse, N. Y. This two-reel sound film covers typical conveyor applications in 14 different industries and illustrates the use of belt conveyors; deflectors; a central dispatcher for controlling adjustable conveyors; live-roll, incline, plant-wide overhead conveyors; limit switches, and so on.

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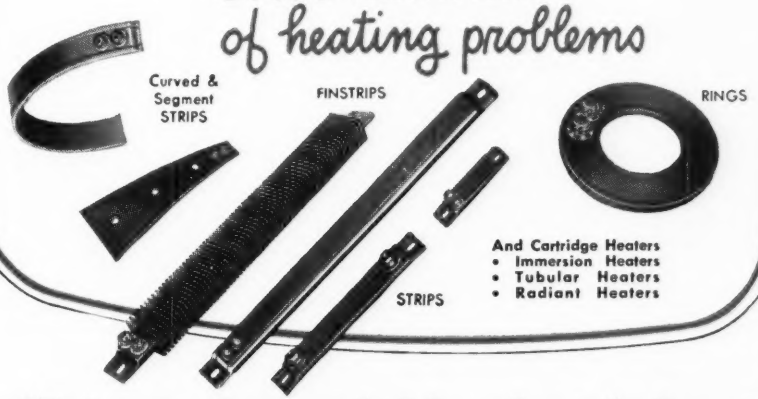

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